AUTOMOTIVE INDUSTRIES

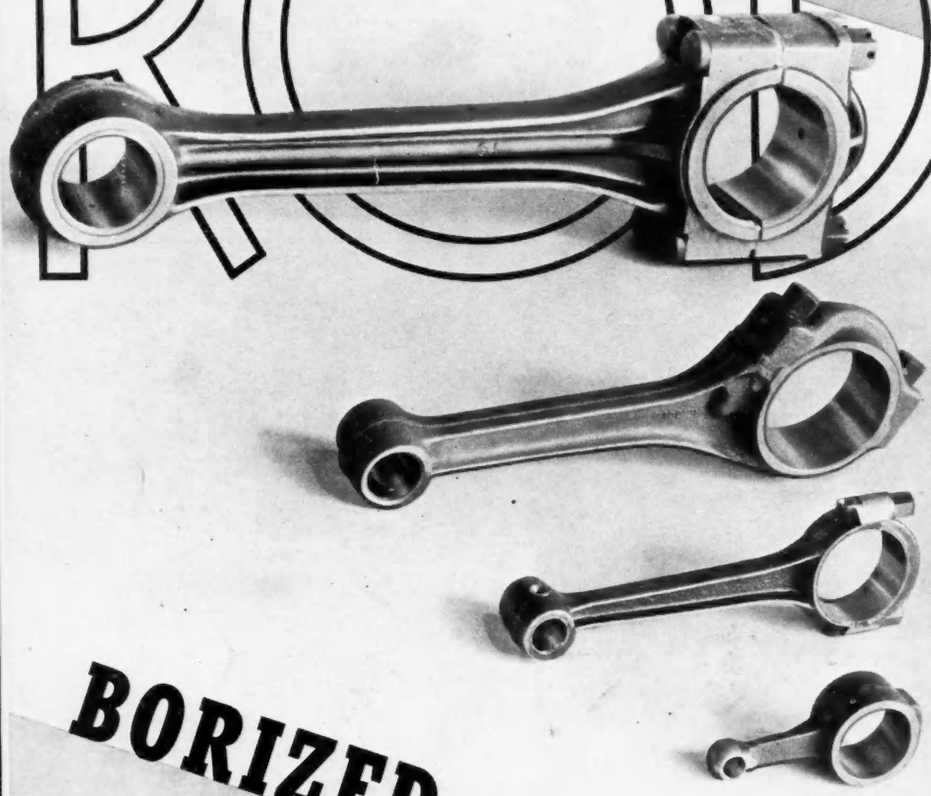
LAND — AIR — WATER

JULY 16, 1938

RODS

for Automobi
Diesel
Airplane
Refrigerator

BABBITT
BRONZE
CAST IRON
STEEL



BORIZED ON HEALD BORE-MATICS

ONE of the many parts on which Precision Boring has proven to be most successful has been connecting rods of all kinds.

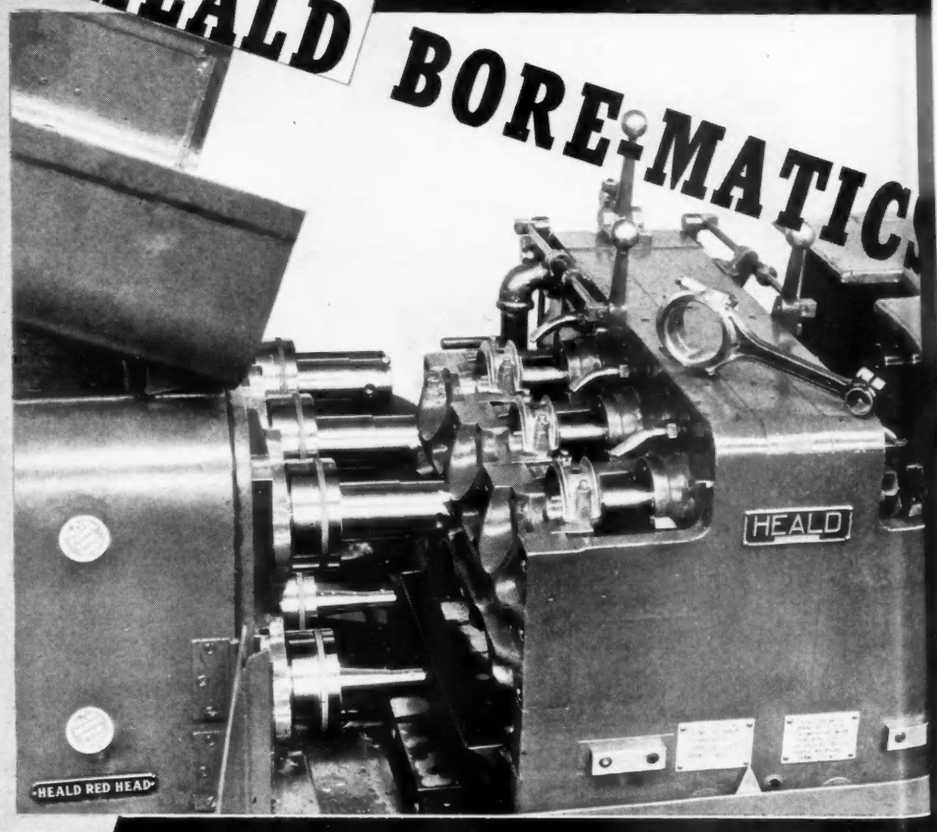
Regardless of size, material or production requirements Heald Bore-Matics have been arranged to handle rods to meet any and all manufacturing demands.

Borizing assures absolutely round, straight holes with correct center distance and parallelism between holes.

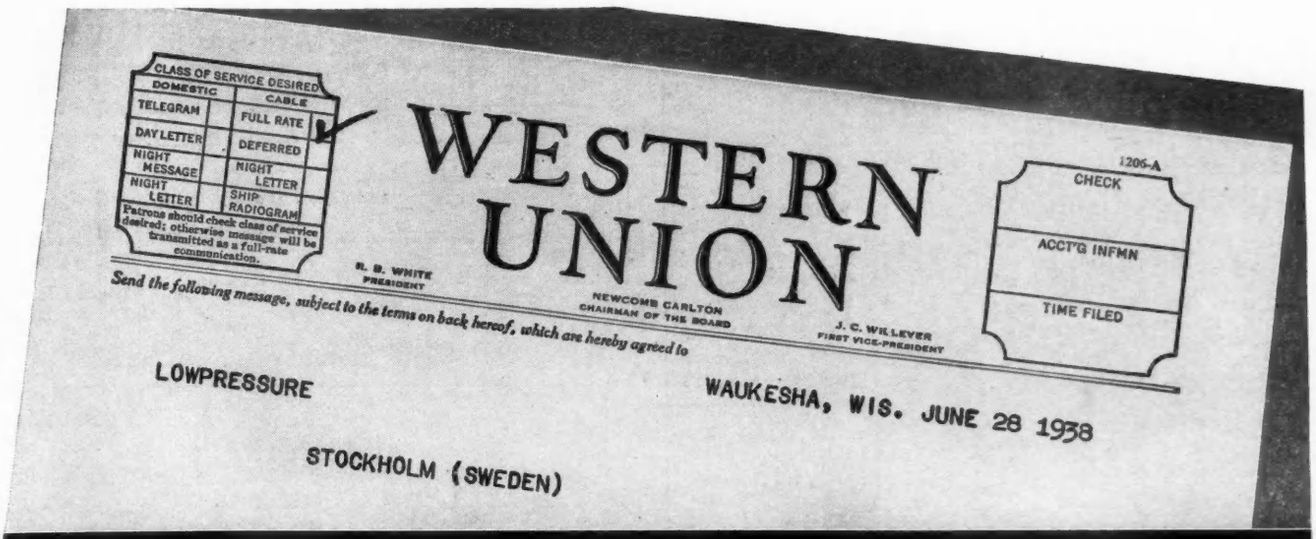
A large automobile manufacturer has a battery of Heald Bore-Matics borizing the steel pin holes and babbitt crank holes simultaneously in three rods at a time at each end of the machine.

One of these machines is illustrated at the right. The operator simply drops the rods in place while the other side is boring. Clamping is automatic. Operation is continuous.

A great many manufacturers demand close tolerances but have a limited production. They have installed Bore-Matics furnished with single station fixtures.



The HEALD Machine Co.
Worcester, Massachusetts



CABLE ADDRESS: LOW PRESSURE, STOCKHOLM

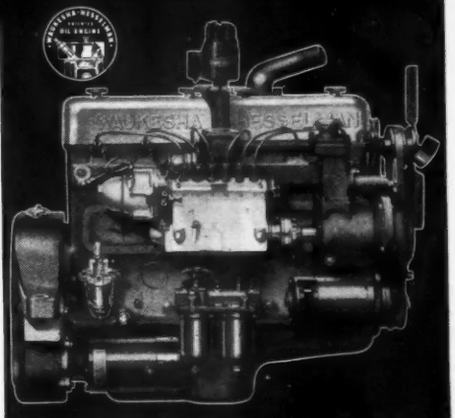
Low pressures are *all important* to long-life engine performance in the mind of the famous Swedish Diesel engineer, K. J. E. Hesselman, inventor of the Hesselman Engine. His cable address: *Lowpressure*, Stockholm, is significant.

In the Waukesha-Hesselman Engine, the designer has full control over the ignition timing and the *rate of pressure rise.* He can determine them *in advance* . . . for all conditions of operation . . . for all kinds of fuel. He can even *control peak pressures in advance!*

Working pressures in Waukesha-Hesselman Engines are the same as those of modern gasoline engines—125-135 lb. compression, 425-450 lb. peak —

Thus Waukesha-Hesselman owners benefit directly from the 40 years of experience of gasoline engine designers—the same proved methods of construction . . . the same proved materials . . . the same proved advances in design—that make the 29 million automotive engines now operating in the United States so dependable. Every one of them contributes to the designers' experience in building Hesselman Engines to operate in the same pressure range. *The Waukesha-Hesselman is not sailing uncharted seas.*

In addition to being a longer-lived engine, the Hesselman burns a wider range of low cost fuels, starts easier, has snappier acceleration and runs smoother than any other oil engine. For all the details *write for Bulletin 1000.*



WAUKESHA HESSELMAN ENGINES

FOR THE GREATEST OVER-ALL ECONOMY

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN

NEW YORK · TULSA · LOS ANGELES

THIS IS No. 7 OF A SERIES ON THE WAUKESHA-HESSELMAN OIL ENGINES

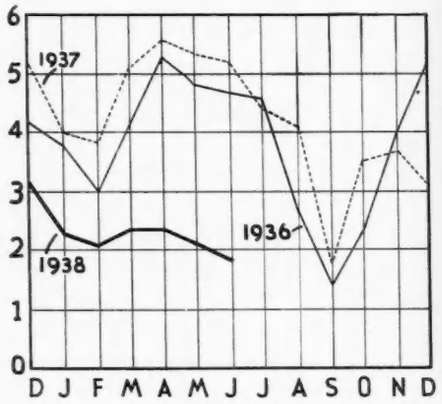
AUTOMOTIVE PRODUCTION*

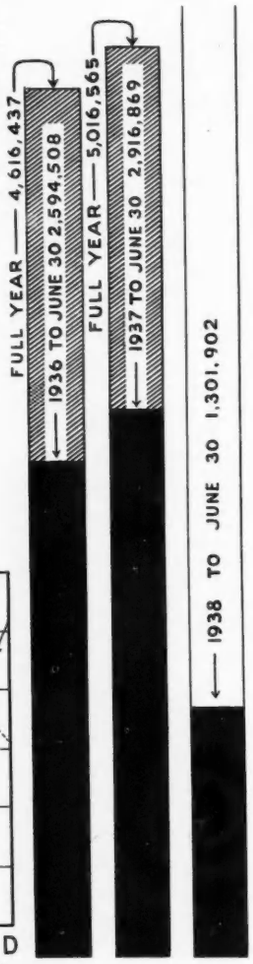
Passenger Cars and Trucks —U. S. and Canada

Bar charts at the right represent total production to June 30th of year indicated.

Numbers at left of monthly graph below show production in 100,000's.

★From Department of Commerce Report and Automobile Manufacturers' Ass'n.





Ideas in Zinc

Automotive engineers appreciate the versatility which the die casting process offers in the production of parts and accessories. Consider the example of the new electrically-operated King-Seely fuel pump, recently announced (A. I. April 23). Here was an entirely new product in this company's line. It presented certain intricacies and refinements of design demanding strength and durability. Die casting of zinc alloy proved to be the economical solution to this problem, and dependability was assured through this choice.

The new pump consists of a tough, sturdy one-piece die cast housing combining the electric pump elements on one side, and the fuel filter on the other. It is made in a standard size for use on passenger cars, motor trucks, buses and industrial equipment of all kinds. The pump has a delivery capacity of 40 gallons per hour free flow, with a normal range of around 20 gallons per hour under normal operating conditions.

Modern die casting technique, combined with the properties of high grade zinc alloys, makes it possible to produce the one-piece housing complete with intricately cored passages, main cylinder, and mounting elements. And not only does the die casting process avoid the multiplicity of machining operations required in other methods of production but, by casting this intricately cored part in zinc alloy, faithful adherence to blue print specifications and dimensional tolerances is assured.

The way is paved to many similar economies through this versatility of the high strength, stable Zamak alloys, based on Horse Head Special ZINC of 99.99+% purity. The New Jersey Zinc Company, 160 Front Street, New York City. *Idea No. 15*

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

Reg. U. S. Pat. Off.
Published Weekly

Volume 79 Number 3

Contents

Departments in This Issue

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AUTOMOTIVE INDUSTRIES

Vol. 79, No. 3
July 16, 1938

Production

June Level Regained as Output Moves Up to 23,000 for Week

Car and truck production for the second week in July went back to the levels maintained during the greater part of June to continue the firming of output that has resulted from the better situation in the retail sales field.

A preliminary check of factory schedules for the week indicated that production of cars and trucks would total approximately 38,100 units as compared with slightly over 23,000 during the previous week which was affected by the July 4 holiday.

To this total General Motors Divisions were expected to contribute better than 15,000 cars and trucks, Ford around 11,000 and the Chrysler Divisions close to 6000. Amongst the independents, Studebaker again took the lead with production of 1470 cars and trucks scheduled for the week. Packard, Nash, and Hudson continued on their previous schedules to keep the industry's final assembly lines in operation.—J. A. L.

Highway Safety Conferees Vote for 50 M.P.H. Daylight Speed

In a three-day session attended by more than 75 recognized highway safety authorities from widely scattered sections of the country, committees of the National Conference on Street and Highway Safety of the United States Chamber of Commerce voted early this week to adopt a flat 50 m.p.h. speed limit for daylight driving and a drop to 45 m.p.h. at night. The proposal was made by Sidney J. Williams of the National Safety Council.

A suggested speed limit of 25 m.p.h. in urban business and residential sections also was approved at the conference. Defeated by overwhelming vote were proposals to fix "absolute" speed limits throughout

(Turn to page 69, please)

CARL BEHN

. . . newly appointed vice-president in charge of all sales divisions for the United American Bosch Corp., Springfield, Mass.

Reo Reorganizes

Six New Directors Elected As Four Former Members Resign

Reorganization of the board of directors of the Reo Motor Car Co. was completed in Lansing, July 12, at a special meeting of stockholders called by Rowland Campbell, chairman of the board. Col. Fred Glover, recently appointed president and general manager succeeding Donald E. Bates, presented the resignations of four members of the former management group and six new directors were elected to fill all vacancies in the nine-member board.

Resignations were accepted from Mr. Bates, George E. Smith, George L. Brown and Walter S. Foster, legal counsel for the company. New directors elected were: J. T. Smith, New York; John R. Moore, Washington; George Stowe, New York; Howard A. Flogus, Lansing, company engineer; Frank Morgan, sales manager; and M. D. Harrison, Detroit.

AUTOMOTIVE INDUSTRIES

Summary of Automotive Production Activity
(Week Ending July 16)

BUSES No significant change in recent manufacturing level. One company, reporting production about 58 per cent of 1937 period, feels "lucky" at this rate.

TRUCKS Production flickering around 50 to 55 per cent of comparable 1937 period. Government orders keeping some plants going at moderate rate. Widespread tendency to close plant instead of staggering vacations. Hand-to-mouth buying evident in fleet purchases, but factory branches report upturn on inquiries and interest.

TRACTORS Business reported better than it has been for months. Tendency to step up rates of operation among suppliers indicates forthcoming accelerated activity in final assembly, possibly lasting through September.

AUTOMOBILES Schedules up about 60 per cent for current week, over previous week affected by July 4 holiday, approximating June rate although July totals are expected to be less.

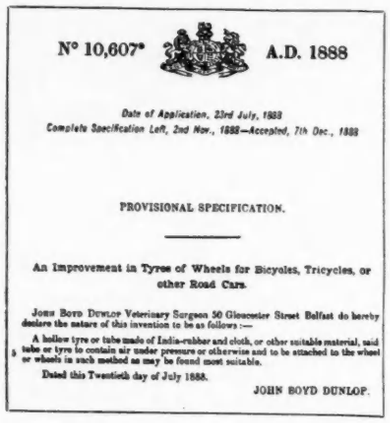
AIRCRAFT ENGINES Government and foreign orders maintaining high production rate. Manufacturers watching with interest progress of engines in 50 hp., 4 cyl. class recently adopted in models announced by two plane manufacturers, and expected to stimulate private purchasing.

This summary is based on confidential information of current actual production rates from leading producers in each field covered. Staff members in Detroit, Chicago, New York and Philadelphia collect the basic information, in all cases from official factory sources.

Pneumatic Tires' Golden Anniversary

This Month Marks Fiftieth Year Since J. B. Dunlop Patented His "Air-Filled Rubber Bags"

Fifty years ago this month a veterinary-surgeon in Belfast, Ireland, John Boyd Dunlop, took out a British patent for a pneumatic tire, and thereby laid the foundation for the pneumatic tire industry of the present day. It is true that Dunlop was not the original inventor of the pneumatic tire. Credit for that invention goes to Robert William Thompson, a Scottish engineer, whose patent on such a tire was issued in 1845, so that the conception of the idea of "riding on air" dates back almost a century. Thompson in his patent specification mentioned that the "elastic bearings around the wheels," as he described his tires, would "enable steam carriages to be run on common roads with great advantages both for carrying passengers and goods." The steam-carriage movement of the early nineteenth century died out, and Thompson's invention of "aerial wheels" was never reduced to practice—to borrow a phrase familiar in the literature of patent litigation—and was, in fact, forgotten during the more than 40 years that intervened between it and Dunlop's activity in this field. Thompson may be said to have been ahead of his time.



N° 10,607* A.D. 1888

Date of Application, 23rd July, 1888
Complete Specification Left, 2nd Nov., 1888—Accepted, 7th Dec., 1888

PROVISIONAL SPECIFICATION.

An Improvement in Tyres of Wheels for Bicycles, Tricycles, or other Road Cars.

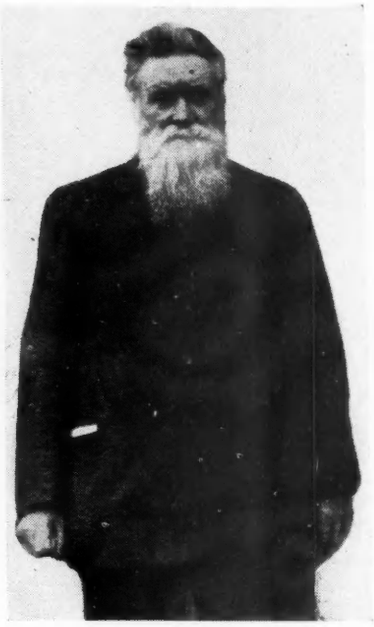
John Boyd Dunlop Veterinary Surgeon 50 Gloucester Street Belfast do hereby declare the nature of this invention to be as follows:—

A hollow tyre or tube made of India-rubber and cloth, or other suitable material, said tube or tyre to contain air under pressure or otherwise and to be attached to the wheel or wheels in such method as may be found most suitable.

Dated this Twentieth day of July 1888.

JOHN BOYD DUNLOP.

Dunlop conceived the idea of an air-filled rubber bag encircling a vehicle wheel independently and under more auspicious circumstances. Popular interest in bicycles had just been aroused, and "high-wheelers" with solid rubber tires were coming into use. Dunlop's son had a tricycle equipped with wire wheels and solid rubber tires. Solid rubber tires were also being used on carriages. The streets of Belfast were paved with cobblestones, and one can readily imagine that the solid rubber tires left much to be desired as regards cushioning shocks on rough pavements. Dunlop, in practicing his profession, had to do a great deal of driving over the roads in the vicinity of Belfast, and it is not quite certain whether the jolts of these rides or the imperfect riding qualities of his son's tricycle first led to the idea of an air-cushioned wheel; at any rate, the scheme was first tried out on the bicycle. One of the objects was to reduce the rolling resistance, and Dunlop is said to have made a test of the invention in this respect by rolling both a wheel equipped with a pneumatic tire and one of the tricycle wheels, over the pavement, noting which one of the wheels rolled farthest. The pneumatic-tired wheel used in this experiment consisted of a wood disc about 18 in. in diameter, to which a tube of sheet rubber, protected by linen strip on the outside, was secured by nails. The tube was inflated by means of a football pump, and the football probably also yielded the necessary valve.



JOHN BOYD DUNLOP

The pneumatic tire won its first success in competition in May, 1889, when a bicycle fitted with these tires and ridden by William Hume, won all events in the Belfast Queens College sports, although Hume had had an accident previously and was not expected to win.

Dunlop's first patent, applied for on July 23, 1888, was accepted on Dec. 2, 1888, and a facsimile of the patent is reproduced herewith. A company to manufacture the tires was formed in Dublin a short time later. The demand for rubber tires for bicycles grew very rapidly, and, the facilities at Dublin becoming inadequate, the Dunlop Rubber Co. moved to Coventry, then the center of the British cycle industry, and later to Birmingham. Within a few years the manufacture of pneumatic tires was taken up in all parts of the industrial world, and a great impetus was given to the bicycle industry.

The Dunlop Rubber Co. used Dunlop's portrait in somewhat idealized

U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes *

The trend reversing, May United States new car registration figures moved down 13,110 units from April to total 172,815. Likewise, estimated dollar volume for May tapered off approximately 7.1 per cent as compared with the preceding month and aggregated $149,800,000.

	NEW REGISTRATIONS			ESTIMATED DOLLAR VOLUME		
		Five Months			Five Months	
	May	Units	Per Cent of Total	May	Dollar Volume	Per Cent of Total
Chevrolet, Ford and Plymouth	104,205	473,178	59.66	$78,600,000	$356,300,000	51.74
Others under $1000	37,244	176,109	22.21	34,100,000	161,000,000	23.37
$1001-$1500	29,203	134,152	16.92	32,500,000	150,100,000	21.79
$1501-$2000	1,238	5,899	.74	2,100,000	10,100,000	1.47
$2001-$3000	695	3,144	.40	1,900,000	8,400,000	1.22
$3001 and over	121	571	.07	600,000	2,800,000	.41
Total	172,706	793,053	100.00	$149,800,000	$688,700,000	100.00
Miscellaneous	109	659				
Total	172,815	793,712				

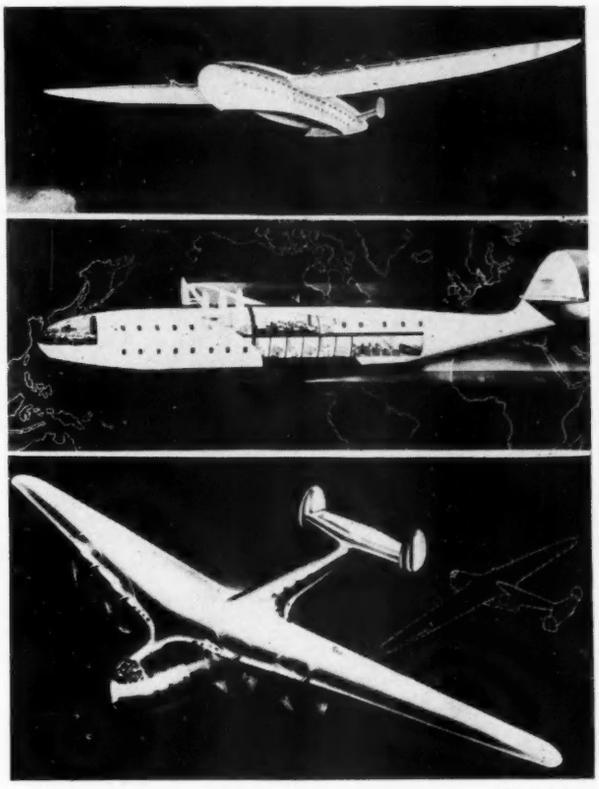
* All calculations are based on delivered price at factory of the five-passenger, four-door sedan, in conjunction with actual new car registrations of each model. The total dollar volumes are then consolidated by price classes. Data do not include returns from Wisconsin.

form as its trade-mark, and as it advertised extensively, his physiognomy probably was more familiar to the bicycling and motoring public of Europe than that of any other inventor. The Dunlop trade-mark gave him the appearance of a rather imperious personage, but actually he was a very quiet and unassuming character. Dunlop accompanied a party of British engineers that visited this country in 1913, and many of the older men in the industry active in S.A.E. affairs at the time in New York, Detroit, and other cities visited by the party, will remember meeting him.

. . . slants

"UNIFORM STANDARDS *for size and weight of vehicles, operative in all States, will assure more uniform enforcement of highway laws and serve the public interest better, not only from the standpoint of economics, but also that of safety as well," said Robert F. Black, president of White Motor Co. and chairman of the motor truck committee of the Automobile Manufacturers Association, in an address made recently before 500 members of the Texas Motor Transportation Association.*

TO PROMOTE SAFETY, *the suggestion that all public schools include a standardized system of traffic education in their teaching schedules has been made by E. J. Poag, director of merchandising and advertising of the Dodge division of the Chrysler Corp.*



International

PAPER PLANS submitted by three leading U. S. aircraft manufacturers in response to an invitation of Pan-American Airways for bids for design and construction of a fleet of giant trans-ocean planes capable of carrying 100 passengers, five tons of baggage and cargo, and a crew of 16 with a non-stop range of 5000 mi. at speeds ranging from 200 to 300 m.p.h. At the top is the candidate of the Sikorsky Co.; center, entry of the Boeing Co.; bottom, conception of the Consolidated Aircraft Co.

Goodyear Layoffs Stir Labor Feud

Company Gives Notice to 1700 Akron Employes as URW Seeks Contract Under Armistice Pact

Renewal of bitter labor feuding in the Akron tire industry to end the peaceful interlude that has existed since the Goodyear riots in Akron on May 29, looms as a strong possibility as result of layoff notices given to 1700 of its employes, July 11, by the Goodyear Tire & Rubber Co. The sudden drastic reduction in the Goodyear working force in Akron comes in the midst of negotiations looking to a union contract with Goodyear under terms of the armistice which was signed to end the series of Goodyear strikes and riots just preceding Memorial Day in which five men were shot and several hundred were wounded and gassed. Since the signing of this armistice pact the new Goodyear Independent Employes Association has become conspicuously active and has petitioned the National Labor Relations Board to hold another collective bargaining election at Goodyear with the new association opposing the United Rubber Workers Union of the CIO.

The air was tense at Goodyear Monday morning, July 11, as the company posted the layoff notices which included many 15-year men, and as officials of the Goodyear local and International URWA went into secret sessions. Learning of the impending layoffs, URWA officials had rushed to Washington in an effort to reach President Roosevelt before his departure on his current trip. Failing in this they had forwarded to him a letter of protest, and then placed their troubles into the lap of the National Labor Relations Board

(*Turn to page 75, please*)

Solbelman

FOOT TALLER than the average man is this heavy-duty truck tire (size 24.00—32; weight, 1200 lb.) just completed by the Goodyear Tire & Rubber Co. for a manufacturer of large earth-moving vehicles. When inflated at 75 lb. per sq. in. air pressure, the 50-ply tire will have a load capacity of 25,000 lb. It has an outside diameter of 82 in., measures 25 in. in cross section, and has a rim diameter of 32 in.

Goodyear men appearing in the photograph are, left to right, C. Slusser, vice-president and factory manager; E. J. Thomas, executive vice-president; and L. B. Tomkinson, general superintendent.

Ourselves and Government

A weekly check list of legislative, executive and judicial actions affecting the automotive industries. First appeared in June 25 issue, p. 831. Corrected to July 14

CONGRESS

Adjourned June 16, *sine die*. All members of House and 36 Senators retire or face election in Autumn.

Legislative Legacies

MONOPOLY INVESTIGATION. Passage of O'Mahoney resolution (S.J. Res. 300) set up temporary National Economic Committee of 12 members to investigate concentration of economic power-monopoly.

Held second meeting July 7. Approved proposed subjects to be surveyed by the six executive departments and placed the activities of the committee for the next six weeks largely in the hands of the departmental representatives. Executive departments will be empowered to subpoena records but not witnesses in making their preliminary studies, provided a three-member subpoena committee grants approval.

Congressional representatives were paired with departmental members July 12 as follows: Senator King and the Justice Department's Thurman Arnold; Senator Borah and FTC Chairman Garland S. Ferguson; Representative Sumners and Treasury's general counsel Oliphant; Representative Reece and Under Secretary of Commerce Patterson; Chairman O'Mahoney and SEC Commissioner Douglas. Executive committee designated to take action in the absence of the full committee includes Senator O'Mahoney, Representative Sumners, Thurman Arnold, Richard C. Patterson and Isador Lubin, the Labor Department representative.

Wendell Berge, Justice Department attorney, has been named as alternate for Arnold.

Public hearings still tentatively scheduled for September.

AIRLINES. Civil Aeronautics Act, 1938, introduced by Senator McCarran (S. 3845) creates a Civil Aeronautics Authority with broad administrative and regulatory powers over air commerce. Signed by President June 23. Appointees are Edward J. Noble, of Greenwich, Conn., aviation enthusiast and candy manufacturer, to be chairman of the Authority; Harlee Branch, of Georgia, Second Assistant Postmaster General in charge of air mail; G. Grant Mason, of Washington, who heads the Pan American Airways' Latin-American Division; Robert Hinckley, of Utah, WPA representative in the West; and Oswald Ryan of Anderson, Ind., Federal Power Commission general counsel. Clinton M. Hester, Treasury Department attorney, was named Civil Aeronautics Administrator. Thomas O. Hardin, of Texas, and Sumpter Smith, of Alabama, were named to the Air Safety Board. A third member has yet to be designated by the President.

WAGES & HOURS. Signed by President June 25, becomes effective Oct. 24, and provides for administration by a wage-hour administrator, yet to be named by the President, whose job is to appoint Industry Committees who recommend minimum labor standards for specific industries. Bureau of Labor Statistics, the Children's Bureau and other divisions of the Labor Department are doing preliminary work, preparatory to whipping an organization into shape when administrator is appointed.

DEPARTMENT OF LABOR

AIRCRAFT LABOR. Walsh-Healey Government Contract Board has given interested persons 14 days from June 24 (later extended to July 25) in which to object to the proposed minimum wage of 60 cents an hour for a 40-hour week in the aircraft manufacturing industry. Objections have been filed but the board declines to make such information public except at hearings.

DEPARTMENT OF JUSTICE

MONOPOLY. Federal Grand Jury in South Bend returned indictments May 28. Bonds of $2,500 each have been filed by 18 individual defendants connected with General Motors. No action so far by other corporations or individuals indicted. (See A.I.—Jan. 15, 1933. Last detailed report A.I.—June 11, 1938.)

WAR DEPARTMENT

Educational orders program, designed to familiarize industrial firms with the country's wartime requirements and faciltate industrial mobilization, expected to be fully under way by Sept. 1. Stll uncertain as to where the $2,000,000, which was authorized but not specifically provided for, is coming from to take care of the first year's orders, the Department nevertheless is beginning a survey to determine which firms are to receive which orders. An expenditure of $10,000,000 during the next five years was authorized by Congress for the program.

Authorized to spend $2,000,000 on development of autogyro and other types of rotary-winged aircraft under the recently enacted Dorsey bill, the department is studying plans to spend the money to the best advantage. Ten autogyros recently purchased (before the new law) have been described as filling a long-felt need in the Army but that the machines were found to be rather fragile for landing on rough ground.

Awarded a $404,076 contract to the Yellow Truck & Coach Co., of Pontiac, Mich., for 318 trucks of the 2½-ton type.

TREASURY DEPARTMENT

PROCUREMENT Division has advertised for bids on 129 trucks, 72 tractors and a wide range of road building machinery. Four Government agencies including WPA, FSA and NYA have asked for the equipment.

MOTOR CARRIER BUREAU

On June 14 the I.C.C. issued an order postponing effect of previous orders relating to maximum hours of service of motor-carrier employes from July 1 to Aug. 1, 1938. (Ex Parte No. MC-2.)

FEDERAL TRADE COMM.

INVESTIGATION under the Withrow-Minton Resolution (M.J. Res. 351) proceding under direction of Dr. Francis Walker of F.T.C. to determine alleged "extent of monopolistic price-fixing and other monopolistic practices engaged in by automobile manufacturers, etc." No new information available on progress or duration of investigation.

VS. GENERAL MOTORS on question of forcing dealers to purchase parts and accesories from G.M. sources only. Hearings began July, 1937.

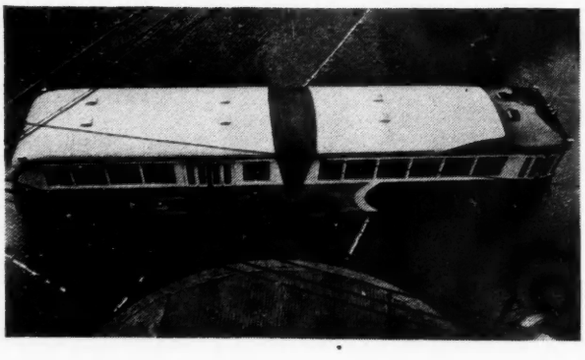
Dealer testimony recentaly taken in Texas. Hearings to be resumed in New York, July 26. Everett Haycraft is F.T.C. attorney in charge.

ADVERTISING. F.T.C. cited Ford and General Motors in July, 1937, complaining of false and misleading representations in advertising prices of automobiles. Case closed last week with presentation of GM evidence. Ford's side having been previously submitted. Case now in hands of trial examiner.

F.O.B. PRICES case vs GM and Ford. Date for hearing expected to be fixed at early date. Complaint alleges advertising misleading because prices do not include standard equipment.

FAIR TRADE PRACTICE RULES pro-

SUPER-TWIN is the name of this new type bus built by Twin Coach Co., Kent, Ohio. The vehicle consists of two 35-passenger size bodies joined together back to back, with large rubber hinges below the floor line. The hinge permits the bodies to move only in the vertical plane, maintaining straight alignment throughout the entire length. Location of the hinge close to the underside of the floor eliminates obstruction in the aisle-way, and the slight amount of movement at the floor line when the vehicle passes over ramps or depressions in the road is absorbed by a collapsible rubber seam which contracts and expands only 7/16 in. At the roof line the ends of the two bodies have a maximum movement of 11 in. and this section is bridged by a rubber diaphragm made especially to stretch in the longitudinal direction, but not in the lateral direction.



The "Super-Twin" is propelled by two dual tire driving axles located in the center and can be powered either by Diesel-electric or trolley bus equipment. Driving motors, being electric in each case, are located approximately amidship of each body unit.

Steering gear consists of a conventional hookup to the front axle with mechanical connections extending similarly to the rear end axle, which turns simultaneously with the front axle, but in the opposite direction. Tires on the rear steering axle are said to exactly trace the tires on the front steering axle, thereby placing the center of pivot on a line projected laterally from the exact center of the driving axles. This makes the turning radius equivalent to that of a 35-passenger vehicle having a wheelbase of 195 in. Manual steering effort is supplemented by an equal amount of air power for use in sharp turns, but ordinarily manual power is claimed to be sufficient in ordinary traffic driving.

posed for retail automobile dealers. This code, introduced at public hearings during last NADA meeting in Detroit (see A. I., April 30, 1938) is still under study by F.T.C. fair trade practice division headed by George McCorkle.

FARM IMPLEMENT industry report, in which the F.T.C. recommended an amendment to the Clayton Act to make illegal the acquisition by large corporations of the stock or assets of competing corporations, has been listed by the Commission to come before the anti-monopoly committee for consideration. The report was severely critical of the International Harvester Co. and seven other manufacturers in whose hands, the Commission said, has been concentrated the bulk of farm implement and machinery production.

STATE LEGISLATION

PENNSYLVANIA Motor Vehicle Dealer's Commission Law (Act 461, 1937) Provides for licensing of dealers, salesmen and appraisers and reporting and enforcement of used-car trade-in prices. Hearings on removal temporary injunction restraining operating Commission set up by Act postponed until September, date of discretion of Dauphin County Court. Act expires automatically May 31, 1939.

U. S. SUPREME COURT

Test of the constitutionality of compulsory automobile inspection ordinances will be finally made if the U. S. Supreme Court agrees to review a suit brought by Edward F. Mayer, of Cincinnati.

Mr. Mayer is challenging the constitutionality of a Cincinnati ordinance compelling inspection of automobles. The ordinance has been sustained by both the Ohio Supreme Court and lower courts. In his writ filed with the Supreme Court Mayer maintained that the ordinance is a direct burden on interstate commerce because it provides for no exceptions for vehicles engaged in interstate commerce, government owned vehicles, or out of town cars.

LABOR RELATIONS CASES

FORD VS. N.L.R.B.: Last report A. I., June 25, p. 828. No new developments.

THE HANSON-WHITNEY MACHINE CO., of Hartford, Conn., has been ordered to bargain collectively, upon request, with Local No. 428 of the UAWU, as the exclusive representative of all production and maintenance workers.

STERLING ELECTRIC MOTORS, INC., Los Angeles, ordered to disband Sterling Electric Motors, Inc., Employes Association as an employe representative which the NLRB said was "dominated and supported by the company." Charges that the company had discriminately discharged a member of the AFofL's electrical workers union dismissed because of insufficient evidence.

Highway Safety Conference

(Continued from page 65)

the country—where a standard is fixed and arrests are made for the slightest infraction.

Among the State speed laws cited during the conference was the Virginia statutes under which motorists are stopped and questioned when their rate reaches 57 m.p.h. and are arrested when traveling 60 m.p.h. or over. The State's new "absolute" 55 m.p.h. speed limit was described as working out satisfactorily by Virginia officials.

E. W. James, of the Bureau of Public Roads, was named to head a committee whose job is to revise the code covering uniform traffic control devices.

Advertising News Notes

Esso merchandised while Howard Hughes circled the globe. From Maine to Louisiana newspaper advertising cheered the machinery manufacturer-movie producer-flier on.

Even in the deepest depths of the recent (has it gone?) depression the circulation of *The Wheel*, Studebaker owner magazine, did not fall below 151,000. Which is considered remarkable by Editor Walker Everett as circulation is paid for by dealers.

The National Motor Truck Show is to be held in New York City November 11 to 17 the same time as the Automobile Show. The show management has announced a photographic contest entitled "Candid Picture of Transportation" with cash prizes of over $750.00. The Four Wheel Drive Auto Company of Clintonville, Wisconsin, as an inducement to photographers to submit pictures of F.W.D. trucks, will double the money of any prize winner if the winning photograph is a picture of a F.W.D. truck. Thus the grand prize which is $250.00 as announced by the National Motor Truck Show would become $500.00 in cash if the winning picture is of a F.W.D. truck.

Automobile dealers have no exclusive claim to bootleg headaches. Socony-Vacuum Oil and General Mills paid $17,500 for exclusive rights to broadcast the Pittsburgh Pirate games away from home over N.B.C. No one has bought the home games, but Station KQV, according to the lawyers, has been "bootlegging" play-by-play news, and the station has been named in a $100,000 suit. How the enterprising broadcaster got the news out of the field is a mystery to the advertisers, ball club, and N.B.C.

United States Asbestos Division of Raybestos-Manhattan, Inc., Manheim, Pa., has just awarded 136 cash and merchandise prizes, totalling $5000.00 in value, for statements from repairmen on "why Grey-Rock brake-lining is the fastest growing line." Edward S. Babcox, Franklin A. Miller, and W. K. Toboldt, editor of *Motor Age*, judged the contest which was managed by E. S. Sensenderfer, advertising manager of U. S. Asbestos.

National Industrial Advertisers Assn. is making its annual advertising budget survey covering its membership and 2,000 additional industrial advertisers. The 1938 questionnaire is expected to provide exceptionally informative data of interest to all industrial advertisers. Copies of the survey report will be sent free to each company answering the questionnaire. Copies may be obtained on request to the Association at 100 East Ohio St., Chicago.

The Commonwealth of Pennsylvania is using scare headlines and horror pictures in a page space campaign in newspapers to educate the driving public on highway safety. The 1938 campaign began two days before the July 4 week end. Thirteen releases will be used in the campaign, which is being supplemented with 12-sheet billboard space for the third consecutive year.

RADIO

Automotive broadcasting on the national hookups dropped nearly a million dollars during the first six months of this year as compared with the like period of 1937, with a total of $2,555,752, as compared with $3,506,741. Columbia, which billed $2,095,996 of the total, showed a gain of 6.1 per cent, and National Broadcasting Co. billed $459,756, or a loss of 70 per cent. Columbia's books show increases by Chrysler, Hudson, Nash-Kelvinator, and U. S. Rubber—the latter billed no broadcasting over C. B. S. during the first six months of 1937. Losses were marked up against Ford, Pontiac, du-Pont, Zerone, Fisher Body and Chevrolet, the last three named having taken no time over the air during the first half of this year.

Columbia showed a total gain of 5.3 per cent in advertising for all industries, and National Broadcasting showed a total gain of 5.4 per cent. Expenditures for all advertisers over these two broadcast systems were $15,581,295 for Columbia, and $21,023,674 for National.

Fuel and lubricants advertising over Columbia dropped from $1,162,146 for the first half of 1937 to $481,212 for the like period of this year.

MAILINGS

Studebaker is peaking its summer selling season with one of the largest direct-by-mail campaigns in the corporation's history. On July 11, more than 180,000 pieces of the campaign had been mailed from the South Bend administration offices. The mailing consists of a 24-page catalog in full color, photographs by famous Paul Hesse, plus a "demonstration plug," which secures an attractive flashlight and cigarette lighter for all prospects who present evidence of having taken a demonstration of a 1938 Studebaker. Mailing goes to dealer-selected lists of prospects.

EXPENDITURES

Taking advantage of the current pick-up in new car sales the agency representing one of the "Big-Three" low-priced cars will spend between $250,000 and $300,000 during the remainder of July in a nation-wide newspaper campaign addressed to consumers.

American Airlines will spend $250,000 in its largest advertising campaign during the last six months of the year, with Ruthrauff & Ryan, Chicago, handling the account.

AGENCIES AND MEDIA

Fiberloid, the plastics division of Monsanto Chemical Co., St. Louis, has appointed Gardner Advertising Co. to handle its advertising, together with the other divisions of the chemical concern. Mrs. Erma Proetz is account executive.

Cord Piston Ring Co., Victoria, B. C., is using Canadian automobile publications to announce a sales contest being handled by McConnell, Baxter & Eastman, Ltd., the agency.

Twin Disc Clutch Co., Racine, Wis., has named Spencer W. Curtiss, Inc., Indianapolis, to handle its advertising. The agency announced that business papers and direct mail will be used.

Weston Barnett, Inc., Chicago, are now handling the advertising of Continental Machines, Inc.

Oakite, widely used in metal manufacturing plants, has announced the largest advertising appropriation in its 30 years of business. Calkins & Holden, Inc., New York, who told the world about Pierce-Arrow and used color when most automobile advertising was black and white, is the agency. Firm believers in business paper advertising, the agency has used "stunt" advertising effectively. Frank A. Conolly, Oakite's merchandising manager, uses showmanship of a high order in increasing the product's sale.

Buell Engineering Co., Inc., has named Williams & Saylor, its agency, to handle the advertising for Buell dust collecting equipment. Trade papers and direct mail will be used.

(Turn to page 72, please)

Automotive Metal Markets

Moderate Increase in Small Lot Buying of Steel by Parts Makers Viewed as Harbinger of Broader Automotive Demand

A moderate increase in small lot buying by parts makers is accepted in the steel market as a harbinger of broader automotive demand, which steel company sales managers believe will make itself more impressively felt in the form of tonnage business from automobile manufacturers next month. Primary steel operations this week are estimated by the American Iron & Steel Institute at 32.3 per cent of ingot capacity, a gain of 43 per cent over the preceding holiday week's record of 22.4 per cent and the best showing in three months.

In the foreground of market discussion continues the realignment of most advantageous sources of supply as the result of the modification of the basing point system. Nearly all of the hasty predictions that have been made in the three weeks, that have elapsed since these changes were announced, completely ignore the fact that, important as price is in the steel market, it isn't the only consideration. While much of the steel used by automotive consumers is standardized in point of minimum properties, even in these tonnage descriptions of steel, deliveries by one mill will give uniform satisfaction to a consumer, while those of another fail to come up to his expectations. When it comes, however, to what are sometimes referred to as "tailor-made" steels, buyers are even more discriminating in choosing their source of supply. The run of perfects in the shipments of one finishing mill will exceed a buyer's expectations, while those of another will come in for criticism. Mill run may mean more or fewer primes.

That the shift in basing points will bring a certain realignment of sources of supply for heavy steel products, is probable. Whether, as some of the prophets predict, this will make of the steel industry a localized affair, remains to be seen. In the same category of speculation belong forecasts of heavy additions to steel-making capacity by the construction of mills in consuming territory with light steel output. It is only natural that some steel buyers should wait for reaction on the part of smaller producers, now that the bigger ones are no longer "holding the umbrella over them," but the general impression in the market is that, displeased as some of these smaller producers may be with these changes, in the long run orderly competition in the steel market will suffer little. Department of Labor hearings later this month under the Walsh-Healey Public Contracts Act on minimum wages are expected to clarify the situation with reference to wage scale adjustments in the steel industry generally.

Recent price reductions have brought a revival of consuming interest to the pig iron market. Some inquiries for iron from automotive foundries are reported.

While the buying movement in non-ferrous metals has flattened out, copper producers are cheered by the fact that fabricators are enjoying the best run of business in months and that copper is being consumed at an encouraging rate. Electrolytic copper continues to be quoted at 9¾ cents. Foreign demand has tapered off a bit and the export price is down 9½ to 9¾ cents.

The tin market has turned dull for the time being. Spot Straits was quoted at 42¾ cents at the beginning of the week and later yielded a fraction. December delivery, however, is quoted at a premium of ½ cent. Declines in Sterling Exchange made for an easier tone.

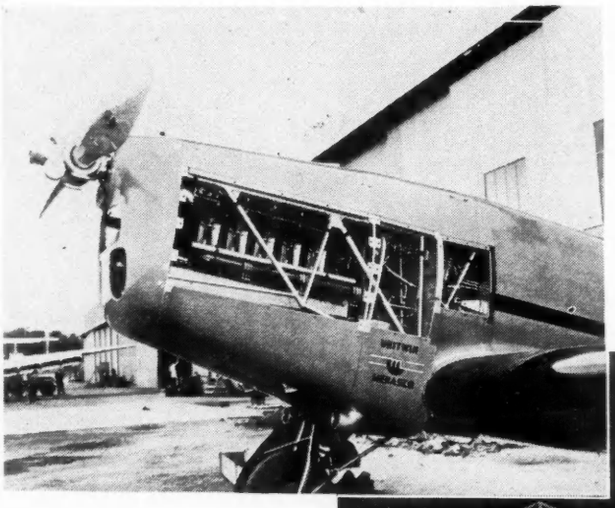
Storage battery manufacturers appear now to have bought all the lead they will need for this month. Prices are unchanged and the market steady to firm. Following the best sales in 10 months, the zinc market turned quiet. Prices are unchanged.—W. C. H.

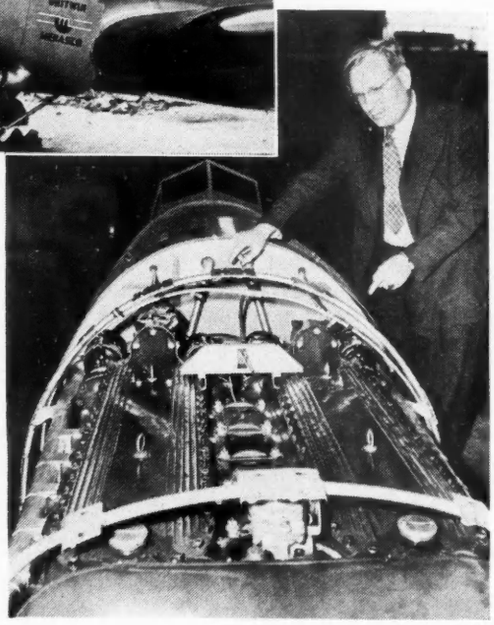
$300,000 For Ford Expansion of Rouge Plant Paper Mill

Expansion of paper mill facilities at the Rouge Plant of the Ford Motor Co. costing $300,000 has been announced.

The expenditure covers a building addition 260 by 60 ft. and new equipment which will increase the paper mill's capacity by about 40 per cent. The equipment is designed for the production of a new resin board developed by Ford for use as upholstery backing in car body interiors.

New equipment includes a giant





TWO ENGINES geared to a single propeller power this new Lockheed Altair airplane which was recently "put through its paces" in the first of a series of trial flights. The 260-hp. Menasco engines are mounted side by side. If either engine should fail, the other could keep the propeller going without drag from the dead unit.

At the right, C. P. Sander, chief engineer for the Menasco Engine Co., is shown inspecting the Lockheed "Unitwin".

Acme

paper board drier 156 ft. long which is capable of drying binder board about four times as fast as any machine of its type. Although temperatures within the drier range from 235 deg. Fahr. to 300 deg. Fahr., the outside is kept cool to the touch through use of special insulating material.

A new 1825-ton hydraulic press, also being installed, is the most powerful of its kind in the paper world. It will heat the resin board to a temperature of 320 deg. and apply to it a pressure of 65 tons to the sq. ft.

New Statistics

New Passenger Cars in Dealers' Hands Totaled 296,000 on June 1

New passenger cars in the hands of U. S. dealers at the beginning of June totaled approximately 296,000 units, after the fifth consecutive month of inventory reduction, according to an estimate compiled by AUTOMOTIVE INDUSTRIES, of which the detailed structure appears on this page.

Beginning with a "cold" estimate of dealer stocks on hand as of December, 1936, the figures trace the relation of factory production allotted to the domestic market to actual retail sales, for each succeeding month to June of this year.

The automobile sales figures which accompany the estimate of dealer stocks are actual factory-reported sales for the months involved, and were made available for the first time last month in the new publication of the Automobile Manufacturers' Association, *Automobile Facts*. Monthly publication of these figures makes available for the first time definite knowledge of both automobile production and sales, and increases the accuracy of estimates of new car stocks. The sales figures cover the period back to December of 1937, and are printed herewith as a matter of record. For recent months, they include sales in the State of Wisconsin, which cannot legally be made available in the form of registration records.

Bantam Offers Trailer

A steel trailer with 750-lb. pay load capacity has been announced by the Bantam Trailer Sales Co., Butler, Pa. Inside dimensions of the unit, which weighs 450 lb., are: length, 82½ in.; height, 43½ in.; width, 49½ in. The tread measures 56 in.

Automobile Sales Figures

1938		Total[1] Factory Sales (U. S. & Canada)	U. S.[1] Domestic Market	Foreign Market[2] (Incl. Canada) Number	Foreign Market[2] (Incl. Canada) %	Retail[3] Sales in U. S.
JANUARY	Cars	168,890[4]	130,273[4]	38,617	22.8	126,442
	Trucks	58,240[4]	35,473[4]	22,767	39.0	32,285
	Total	227,130[4]	165,746[4]	61,384	26.9	158,727
FEBRUARY	Cars	151,133[4]	119,896[4]	31,237	20.6	120,348
	Trucks	51,456[4]	32,314[4]	19,142	37.0	29,606
	Total	202,589[4]	152,210[4]	50,379	24.8	149,954
MARCH	Cars	186,341[4]	153,316[4]	33,025	17.7	188,325
	Trucks	52,257[4]	34,627[4]	17,630	33.7	39,559
	Total	238,598[4]	187,943[4]	50,655	21.2	227,884
APRIL	Cars	190,111	160,028	30,083	15.8	193,392[4]
	Trucks	48,022	31,830	16,192	33.7	35,038
	Total	238,133	191,858	46,275	19.4	228,430[4]
MAY	Cars	168,599	140,239	28,360	16.8	187,306
	Trucks	41,584	27,935	13,649	32.8	34,914
	Total	210,183[4]	168,174	42,009	20.0	222,220
JUNE	ESTIMATED TOTAL	184,400[5]	———	———	———	———
1937						
JANUARY	Cars	324,191	285,749	38,442	11.9	249,715
	Trucks	74,995	53,874	21,121	28.2	48,037
	Total	399,186	339,623	59,563	14.9	297,752
FEBRUARY	Cars	310,961	276,469	34,492	11.1	216,770
	Trucks	72,939	53,765	19,174	26.2	47,077
	Total	383,900	330,234	53,666	14.0	263,847
MARCH	Cars	423,006	376,245	46,761	11.0	409,205
	Trucks	96,016	75,829	20,187	21.0	73,361
	Total	519,011	452,074	66,948	12.9	482,566
APRIL	Cars	452,907	410,592	42,315	9.4	387,887
	Trucks	100,324	79,604	20,720	20.7	72,720
	Total	553,231	490,196	63,035	11.4	460,607
MAY	Cars	443,412	400,415	42,997	9.7	407,610
	Trucks	96,965	74,398	22,567	23.2	66,411
	Total	540,377	474,813	65,564	12.1	474,021
JUNE	Cars	429,333	387,121	42,212	9.8	365,160
	Trucks	91,820	66,331	25,489	27.8	64,597
	Total	521,153	453,452	67,701	13.0	429,757
JULY	Cars	372,913	341,189	31,724	8.5	347,120
	Trucks	83,996	61,178	22,818	27.2	60,925
	Total	456,909	402,367	54,542	12.0	408,045
AUGUST	Cars	317,270	299,496	17,774	5.6	310,312
	Trucks	87,802	64,514	23,288	26.4	63,353
	Total	405,072	364,010	41,062	10.1	373,665
SEPTEMBER	Cars	120,597	110,122	10,475	8.7	192,967
	Trucks	55,033	36,402	18,631	33.8	53,303
	Total	175,630	146,524	29,106	16.6	246,270
OCTOBER	Cars	306,040	273,753	32,287	10.6	212,651
	Trucks	31,939	22,595	9,344	29.3	31,510
	Total	337,979	296,348	41,631	12.3	244,161
NOVEMBER	Cars	309,121	269,580	39,541	12.8	212,389
	Trucks	67,508	48,969	18,539	27.4	28,721
	Total	376,629	318,549	58,080	15.4	241,110
DECEMBER	Cars	259,184	212,655	46,529	17.9	171,643
	Trucks	88,165	52,215	35,950	40.7	33,480
	Total	347,349	264,870	82,479	23.6	205,123

Sources: [1]U. S. Census Bureau. [2]U. S. Census Bureau and Dominion Bureau of Statistics. [3]Automobile Manufacturers Association. [4]Revised.

Estimated Dealer Stocks of New Passenger Cars

1937	January	February	March	April	May	June
Production—U. S. Domestic Market†	285,749	276,469	376,245	410,592	400,415	387,121
Retail Sales—U. S.‡	249,715	216,770	409,205	387,887	407,610	365,160
Change in Inventory	+36,034	+59,699	−32,960	+22,705	−7,195	+21,961
Inventory, first of month	248,200	284,234	343,933	310,973	333,678	326,483
1937 (continued)	**July**	**August**	**September**	**October**	**November**	**December**
Production—U. S. Domestic Market	341,189	299,496	110,122	273,753	269,580	212,655
Retail Sales—U. S.	347,120	310,312	192,967	212,651	212,389	171,643
Change in Inventory	−5,931	−10,816	−82,845	+61,102	+57,191	+41,012
Inventory, first of month	348,444	342,513	331,697	248,852	309,954	367,145
1938	**January**	**February**	**March**	**April**	**May**	**June**
Production—U. S. Domestic Market	130,273	119,896	153,316	160,028	140,239	
Retail Sales—U. S.	126,442	120,348	188,325	193,392	187,306	
Change in Inventory	+3,831	−452	−35,009	−33,364	−47,067	
Inventory, first of month	408,157	411,988	411,536	376,527	343,163	296,096

†—U. S. Census Bureau. ‡—Automobile Manufacturers Association.

BUSINESS IN BRIEF

Written by the Guaranty Trust Co., New York

Moderate optimism prevailed in most business quarters last week, and reports from various sections of the country were favorable. The index of business activity compiled by the *Journal of Commerce* for the week ended July 2 stood at 69.8, as compared with 68.8 the week before and 99.4 a year ago. Sharp advances were made in car loadings and petroleum runs-to-stills, while slight declines were made in electric output and automobile production.

The continued hot weather and better demand in farm districts last week resulted in gains in retail trade above the level in the preceding week of from 4 to 10 per cent. Wholesale business was from 8 to 15 per cent higher.

Railway freight loadings during the week ended July 2 totaled 588,864 cars, which marks a rise of 29,927 cars above those in the preceding week, a decline of 213,482 cars below those a year ago and a drop of 60,839 cars below those two years ago.

Production of electricity by the electric light and power industry in the United States during the week ended July 2 was 10.0 per cent below that in the corresponding period last year.

Lumber production during the week ended June 25 stood at 56 per cent of the 1929 weekly average. Production was greater than in the preceding week, while new orders surpassed those in any week preceding in the second quarter. Shipments declined 5 per cent.

According to the Bureau of Agricultural Economics, world wheat production in the 1938-39 season may total between 4,025,000,000 and 4,075,000,000 bushels. World stocks of old wheat on July 1 are estimated at 650,000,000 bushels, as compared with 556,000,000 bushels on the corresponding date in 1937.

A recent report of the Bureau of Agricultural Economics places farmers' cash income from marketings in May at $509,000,000, as compared with $489,000,000 in April and $577,000,000 in the corresponding month last year.

Professor Fisher's index of wholesale commodity prices for the week ended July 9 stood at 81.2, as compared with 80.9 the week before and 81.1 two weeks before.

The consolidated statement of the Federal Reserve banks for the week ended July 6 showed a decline of $2,000,000 in holdings of discounted bills. Bills bought in the open market and Government securities remained unchanged. Money circulation increased $86,000,000 and the monetary gold stock rose $5,000,000.

J. E. Padgett, vice-president in charge of engineering Spicer Mfg. Corp., has published a pamphlet entitled **"Abundance—For The Forgotten Man."** In the words of Mr. Padgett, "This primer seeks to give some fundamental truths about the major problems of today."*

Diesel Equipment Corp., Chicago, has brought out a folder on **fuel injection equipment** which contains the following pam-

* Obtainable from editorial department, AUTOMOTIVE INDUSTRIES. Address Chestnut and 56th Sts., Philadelphia.

GM June Car Sales Totaled 101,908

June sales of General Motors cars to dealers in the United States and Canada, together with shipments overseas, totaled 101,908, compared with 203,139 in June a year ago. Sales in May were 104,115. Sales for the first six months of 1938 totaled 613,953, compared with 1,097,370 for the same six months of 1937.

Sales of G. M. cars to consumers in the United States totaled 76,071 in June, compared with 153,866 in June a year ago. Sales in May were 92,593. Sales for the first six months of 1938 totaled 498,120, compared with 871,226 for the same six months of 1937.

Sales of G. M. cars to dealers in the United States totaled 72,596 in June, compared with 162,390 in June a year ago. Sales in May were 71,676. Sales for the first six months of 1938 totaled 419,648, compared with 879,188 for the same six months of 1937.

Advertising Notes

(Continued from page 69)

Schipper Associates, New York and Detroit, have been named publicity and advertising counsel for the Fifth Annual National Motor Truck Show to be held in Commerce Hall, Port Authority Building, New York, November 11 to 17.

Compilation of the National Transportation Year Book has commenced under the supervision of the Schipper organization.

MEN

Fred Shaw, publicity director in the Detroit office of Geyer Cornell & Newell, Inc., the agency serving Nash-Kelvinator Corp., was so flushed by the success of the National Sales Crusade which his agency helped their client launch that he immediately looked for new fields to conquer.

While lunching in New York with two fellow publicity men he read news of the closing by strike in Scranton of the Ringling Bros., Barnum & Bailey Circus and the trio immediately started a "Save the Circus" campaign.

They already have enlisted the support of the Adcraft Club of Detroit which in turn has circularized 60 affiliated advertising organizations.

Campbell-Ewald Co., Inc., New York, has appointed E. A. Elliot director of media, including radio time. Charles Dreier has been named head of the agency's schedule department.

B. M. Ikert, consultant on automotive technical problems and contributing editor to AUTOMOTIVE INDUSTRIES, has been appointed Chicago technical manager for the Associated Sales Company, Detroit, producers of promotional slide films.

Leaving Shell Petroleum as sales promotion and merchandising head, L. H. Spiner, director of advertising, will enter the sales management field as a consultant, effective Aug. 1.

Milwaukee Association of Industrial Advertisers is under the leadership of automotive men, with P. C. Ritchie, Waukesha Motor Co., as vice-president; Arnold Andrews, Bucyrus-Erie, director for three years; and James Tate, Delta Co., secretary-treasurer. Walter E. Schutz, Perfex Controls Co., is the new president.

Irving J. Rosenbloom, formerly account executive with Gundlach Advertising Agency, Chicago, has organized Irving J. Rosenbloom Advertising Agency, 400 N. Michigan Avenue, Chicago. E. F. Sergey, formerly Gundlach production manager, has joined the new agency in the same capacity. Accounts include Delta Mfg. Company, Milwaukee and Fairyfoot Products Company, Chicago.

Henry T. Ewald, world-famed automobile advertiser, has been elected a director of Detroit's Symphony Society.

James Kennedy, Jr., well known among automobile advertising men, is back with J. Stirling Getchell where he will handle advertising copy for De Soto and Transcontinental & Western Air, Inc. He has, in the meantime, been with Cecil, Warwick & Legler as copy chief, and J. Walter Thompson Co.

Francis H. Marling has been appointed advertising manager of Pure Oil Co., Chicago.

ARTHUR R. FORS

. . . who has been appointed vice-president in charge of manufacturing of Airtemp, Inc., air conditioning subsidiary of the Chrysler Corp.

MEN OF THE INDUSTRY

R. J. TELFORD has been appointed general manager of the Reo Motor Co. of Canada, Ltd., Toronto, Ont.

GEORGE M. MADOLE, formerly assistant managing director of the B. F. Goodrich Co. in Colombes, France, has been named assistant to G. E. Brunner, manager of the original equipment tire division of the Goodrich parent offices in Akron, Ohio. Mr. Brunner succeeds T. A. Aspell, assigned to executive duties. Mr. Madole joined Goodrich in 1910 and was sent to France in 1917, becoming works manager in 1923 and assistant managing director in 1928. He is a member of the French Legion of Honor.

C. SCOTT FLETCHER, sales manager of the Studebaker Corp., journeyed far into Canada for fishing during his holiday. Evidence of his skill with the rod and reel is on display in his office, half a hundred Leica shots of rainbow trout, salmon, northern pike and others of the finny tribe.

ROY COLE, vice-president in charge of engineering of the Studebaker Corp., and **WAITS W. SMITH,** executive engineer of the same company, flew Studebaker's champion aura at the masthead of the yawl that won them a second place in the recent Chicago-Saugatuck yacht race.

C. D. Boerlage

C. D. Boerlage, one of the world's leading petroleum technologists, died June 29. He was 52. For a number of years he had been the director of the Delft, Holland, Laboratories of the Royal Dutch Shell, and was secretary of the petroleum section of the Netherlands Royal Institution of Engineers; also a member of the Society of Automotive Engineers.

AUTOMOTIVE ABSTRACTS

Thickness of Coating on Anodized Parts

It is sometimes desired to determine the thickness of the alumina coating which is produced on pistons and similar aluminum parts by the anodizing process. According to a report by F. Leopelmann of the German Research Institute for Aviation, at Berlin-Adlershof, this determination can be made very simply in the following manner: The parts which have received the anodizing treatment are immersed in a 5 per cent soda solution containing 1 per cent zinc in combination. When the oxide coating has been completely dissolved is shown by the fact that dark zinc deposits begin to appear on the aluminum. The thickness of the coating is given by the difference in thickness before and after treatment.—*Chimie et Industrie,* March.

Labor

Union Opponents of Homer Martin Win Opportunity to Air Views

Internal affairs of the United Automobile Workers Union, the industry's CIO affiliate, became more involved than ever during the past week. Opponents of Homer Martin, UAW president, appeared to have gained the advantage through the most recent turn of events whereas a week ago the union president showed signs of being master of the situation.

Most recent developments saw Martin supporters defeated when the Detroit district council of the UAW adopted a resolution calling for conference of the executives of all UAW locals at which both sides in the controversy would have an opportunity to express their opinions. The resolution was introduced by supporters of the five ousted officers and was adopted by a 48-40 vote over the bitter opposition of Martin supporters who declared that such a conference would be a violation of the union's constitution.

The conference has been called for July 25, and if held, will come on the same day set for the trials of the suspended officers.

A third attempt to secure the intervention of John L. Lewis, CIO chieftain, also was voted by the district council which appointed a committee of locals' presidents to call on Lewis and urge his active efforts in support of peace.

Martin opponents also were reported to be preparing for a national meeting of their faction to open a drive for a special convention to remove Martin. They claim that sufficient locals have adopted resolutions favoring the convention to require the holding of a referendum. A meeting in Detroit in the near future is expected to start a drive for the convention and the support of Lewis for this drive also was being sought. Meanwhile the Martin administration has denied that enough locals have voted in favor of a convention to meet the constitutional requirements.

June Rim Inspections Off 75 Per Cent

Total number of rims inspected and approved in June by the Tire & Rim Association, Inc., amounted to 527,121, a drop of slightly more than 75 per cent from the June, 1937, figure.

For the first six months of 1938 the total number of rims inspected and approved by the association aggregated 4,063,384, a decrease of approximately 68.5 per cent as compared with the total for the similar period of the preceding year.

40 Years Ago

with the ancestors of AUTOMOTIVE INDUSTRIES

The Haynes-Apperson Company

The Haynes-Apperson Company . . . recently incorporated under the laws of the State of Indiana, with a capital of $25,000, are now erecting a new factory at Kokomo which will enable them to turn out one carriage a week, their present output being limited to one every two or three weeks.

From *The Horseless Age,* July, 1898.

Letters to Automotive Industries

Editor, Automotive Industries:

I have been reading Automotive Industries for over ten years but I have never read anything in it relating to a problem that may be only local. I have traveled in some thirty of these United States, lived in four of them and have only found this trouble to exist in such an outstanding way in Eastern Arkansas and Mississippi.

To get out of my town going anywhere you must go over a minimum of fifteen miles of bad gravel road.

Rocks, water and sharp sandy gravel particles are mixed up into the worst abrasive imaginable and thrown into the exposed working parts of the shock absorber. This naturally shortens the life of these parts very seriously, which I will try to illustrate from my own experience.

This trouble did not show up so greatly until about 1933 when spring rates began to be lowered and the shock absorbers had to do more work. I was at that time driving one of the all three class with double acting shock absorbers, in 18,000 miles I broke one spring and put on one pair SA on the front, and seven pair on the back, filling them with fluid every 500 miles. At this time the other two of the big three were, I believe, using a single acting shock absorber and having no serious trouble. My trouble was universal with any of the same make of car and is still true to a certain extent. I have a 1936 model of the same make car bought in the west and driven out west over types of roads and weather conditions 18,000 miles. After making about my third trip over our gravel roads here, the shock absorbers were gone and had to be replaced.

While out west I observed no trouble such as exists here. I thought perhaps that not seeing any trouble out there that the engineers had corrected those troubles in the past three years, but on returning here I find that is not true.

On the 1937 model of one of the big three was introduced the direct acting shock absorbers and therewith their trouble started. I talked with an owner of one of these cars who had traded his 1934 model off because of shock absorber and brake trouble on this 1937 model with airplane type shock absorbers and has spent over $160 replacing springs and shock absorbers in only 24,000 miles.

This may be an extreme case, my case may be extreme, but it looks to me like the engineers should check up a little closer on an area like this because when the shock absorbers go, the springs go, the control of the car is impaired, and that all happens pretty fast down here.

I think that if some of the companies would put a test car on our gravel roads where we have so much rain they would find out a lot of things that would probably surprise them, about brakes, shock absorbers, springs, tires and bodies.

T. E. Tappan, Jr.,
Helena, Ark.

Comment No. 1

Editor, Automotive Industries:

And have you and Arthur Fertig given the automobile manufacturers, their dealers and installment sales finance companies something to think about in your July 9th issue of Automotive Industries?

Not only a new thought but a definitely sobering one.

W. P. Berrien,
Executive Secretary,
Philadelphia Automobile Trade Association.

Tools of Tomorrow

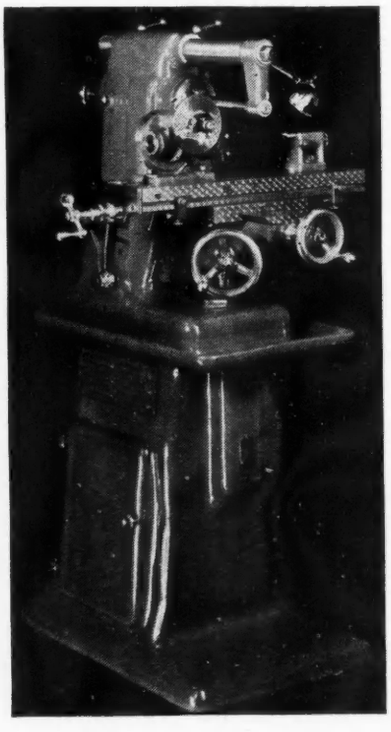
Rubber springs that relieve workers and machines of "jitters" and promote efficiency and economy by eliminating vibration were described recently by F. L. Haushalter, development engineer for the B. F. Goodrich Co., at a conference held at the Massachusetts Institute of Technology.

Rubber springs have met wide success in machines ranging up to 500,000 *lb., according to Mr. Haushalter, who said that the rubber mountings—called "vibro-insulators"—may eliminate as much as* 90 *per cent of the vibration in machinery and extend the longevity of structures in which the machines are housed. Unlike other substances, Haushalter said, scientifically compounded rubber can be subjected to extensive distortions without creeping or setting excessively. Rubber, he added, is one of the few substances which can be stretched* 700 *per cent or more. Some vulcanized rubber compounds are so elastic that they can be stretched more than* 1000 *per cent at ordinary temperature before reaching the breaking point.*

Precision Milling

. . . New model Hardinge machine features compact dimensions and ease of operation

A new model precision milling machine for tool room and laboratory use has been announced by Hardinge Brothers, Inc., Elmira, New York. Eight spindle speeds, both forward and reverse, are available with the model BB5, and range from 110 to 1850 r.p.m. Among the features pointed out by the manufacturer are the following: feed screws revolve in long adjustable nuts and have friction dials graduated in thousandths of an inch; hand wheels for transverse and vertical feed have clutch throw-out; enclosed headstock with "connected bearing" design—adapts one-inch round capacity collets and includes notched draw spindle and spanner wrench; enclosed vee-belt drive with conveniently located lever speed control; driving unit does not employ gears, clutches or loose pulleys.



Hardinge model BB5 precision milling machine

The table of this machine has a working surface measuring 20 in. by 6 in., and three T-slots which are 7/16-in. wide. The range includes 13 ¾-in. longitudinal, 6-in. transverse, and 7-in. vertical. Distance from center of the spindle to the table in lowest position is 7 in.

Die-Casting

. . . Madison-Kipp "Cold Chamber" type machines especially for aluminum, magnesium, and brass

To provide for production of die castings made from various alloys of aluminum, magnesium, and brass, the Madison-Kipp Corp., Madison, Wis., has announced a new "400 Series" of cold chamber type die casting machines. These are made in three sizes. The smallest is known as the No. 400, which has a capacity for aluminum castings up to 0.9 lb., including the casting and gate, while for brass, the capacity is 1.5 lb., for

both casting and gate, and for magnesium, 0.6 lb.

Total injection pressure on the metal in the No. 400 machine is 19,000 lb. The intermediate size is known as the No. 440, and the large size No. 404. The total injection pressure on the metal for the intermediate size No. 440 is 38,000 lb. The weight of the gate and casting may be 2 lb. in aluminum, 1.2 lb. in magnesium, 5 lb. in zinc, and 3 lb. in brass. For the largest size No. 404, the total injection pressure on the metal is 63,000 lb., and the rated capacities of gates and castings in the various alloys are 3.25 lb. in aluminum, 2.16 lb. in magnesium, 7.4 lb. in zinc and from 2 to 4½ lb. in brass.

All of these machines are furnished with provision for applying ample pressure to force the molten metal into the die space by hydraulic power; and a powerful hydraulic locking mechanism holds the die closed during the casting period at the same time eliminating all strain on the die moving mechanism. The molten metal is handled in such a way that there is no danger of contaminating the alloy with iron.

Shim Stock

. . . Laminum carton designed to facilitate shop storage and use

A container to facilitate shop storage and use of thin brass shim stock has been introduced by Laminated Shim Co., Inc., Long Island City, N. Y. Packed within the new carton is an assortment including four rolls 50 in. long, in thicknesses of 0.001, 0.002 and 0.005-in. The carton is arranged so that stock may be pulled through slots and cut off as needed. Trouble in handling is eliminated, time is saved, and wrinkling and waste of stock prevented.

Goodyear Layoffs Stir Labor Feud

(Continued from page 67)

which assigned P. W. Chappell, veteran arbiter in Akron's labor disputes, to the Akron zone for observation.

The Goodyear layoffs reduce the Akron force to approximately 7000. Officials say the move is for the purpose of restoring the plant to a four-day six-hour shift basis, with all employes receiving a minimum of 24 hr. a week. C. Slusser, vice-president and factory manager, stated that under the new Goodyear policy employes shall be considered as "surplus labor" when their weekly average work time goes below 24 hr. The new plan provides for transfer of older employes to other departments without loss of seniority rights—or to other departments for identical work where there are employes with less continuous service on such operations.

The company is paying the men laid off in cash in lieu of having them work out the usual layoff notice time.

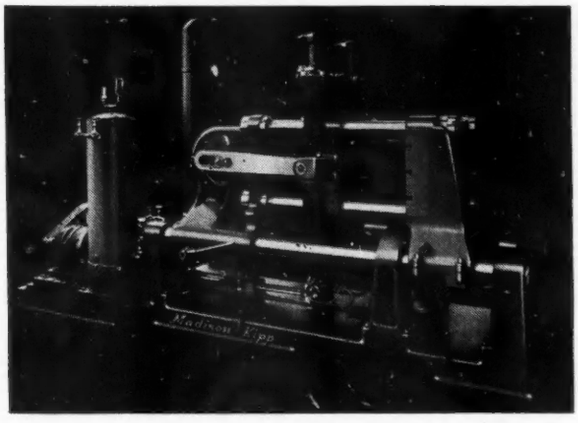
United Rubber Workers Union and CIO officials bitterly assailed the new Goodyear move. John Brophy, CIO director in Washington, in a special dispatch from that city, is quoted as charging the Goodyear move to be a deliberate maneuver to disrupt negotiations looking toward a CIO contract. The CIO has contracts with Goodrich and Firestone, not with Goodyear.

"The company evidently is trying to jump the gun on a matter which is one of the subjects of negotiation —namely the protection of seniority, reinstatement and other rights of workers when they are confronted with layoffs," declared Brophy. "We shall do everything in our power to call public attention to any failure by the Goodyear company to live up to the spirit of collective bargaining in good faith. We shall throw all possible support behind the United Rubber Workers in their resistance to this assault and in their efforts to reach a peaceful and mutually satisfactory conclusion in the present negotiations."

While the URWA won collective bargaining rights by a 60 per cent vote of employes last August, officials of the new Independent Employes Association declared that the 1700 layoffs would give the new organization an absolute majority of remaining employes and enable the Independent group to wrest collective bargaining rights from the URW. They indicated that they would press their plea to the NLRB for an immediate employe referendum at Goodyear.

Meanwhile Akron URW officials petitioned WPA authorities to rush additional grants to the Akron area so that as many as possible of the 1700 men could be absorbed on WPA projects. Akron WPA directors pledged all possible support. Akron WPA projects now have 18,956 now at work. The majority are said to be ex-tire builders.

The Goodyear layoffs come at a time when the tire industry is considering its corner turned, and is planning to step up production. While original equipment sales are sharply below those of a year ago, replacement sales are running ahead of a normal seasonal pace. Inventories are 23 per cent under a year ago and prices are firm. Goodyear is one of the major suppliers of the original equipment market.



Madison - Kipp "Cold - Chamber" type die casting machine

George E. Clarke

George E. Clarke, assistant sales manager of the Hupp Motor Car Corp., died in Detroit on July 8 after a month's illness. He entered the automotive industry in 1914 with the former Maxwell Motor Co. For a number of years he was Detroit branch manager for the old Willys-Overland Co., later working in the home offices in Toledo. He returned to Detroit as general manager of the Hupmobile Sales Corp., State distributors for Hupp cars and then became president of the Willys-Detroit Co., leaving there in turn to join the Hupp Motor Car Corp.

Books

of automotive interest

ROADS, CANALS AND EMBANKMENTS WITH CATERPILLAR EQUIPMENT. *Published by Caterpillar Tractor Co., Peoria, Ill. Price, 50 cents.*

The book was written by F. A. Nikirk, a civil engineer who, before coming with the Caterpillar Tractor Co. in 1927, had had long experience in the design and construction of engineering projects. Since coming with the tractor company, Mr. Nikirk has devoted himself to a study of equipment uses, of the adaptability of equipment to field requirements, and of the work that may be expected from various units.

The various types of work dealt with in the book include road construction, road improvement, paving and road surfacing, road maintenance, building canals with blade graders and elevating graders, canal maintenance, embankments, terracing as a means of soil-erosion control, and selection of equipment. The book is illustrated with numerous fine field photographs and with some diagrams.

KENT'S MECHANICAL ENGINEERS' HANDBOOK — *Design, Shop Practice (Vol. III of Wiley Engineering Handbook Series). Robert Thurston Kent, M.E., editor in chief. Published by John Wiley & Sons, Inc., New York.*

The eleventh edition of Kent's well-known handbook appears in two volumes, of which the first deals with Power and the second with Design and Shop Practice. A review of the first volume appeared in the Jan. 2, 1937, issue of AUTOMOTIVE INDUSTRIES, while a copy of the second volume has just come to hand. This volume, like the first, has been prepared with the collaboration of a staff of specialists. Since the publication of the tenth edition in 1923 many new materials of engineering were developed and improvements made in tools and processes which rendered many of the data in the earlier edition obsolete, and the book was, therefore, practically rewritten. This also added materially to the amount of material available, and as the previous edition was already inconveniently bulky, it was decided to divide it in two volumes.

In the second volume, which issued from the press recently, engineering materials, machine elements of all kinds, building construction, shop equipment, and shop processes are dealt with. The material is divided into numerous sections, and each section has its pages numbered separately, as in the first volume. The treatment, of course, is in the familiar brief handbook style, and numerous formulas, tables and diagrams are used.

In the shop practice section, automobile production practice has received due consideration. Thus we find items on axle and crankshaft grinding, cylinder-block milling, bumper polishing, forging equipment for automobile parts, engine mountings, differential bearings, etc. Of course, practically all of the various machine shop practices are applicable to automobile production, and there is, therefore, a great deal of information in the volume that is useful to the automotive production engineer. Among the most interesting sections of the Design portion of the volume are sections on Bearings and Lubrication and on Vibration and Noise.

This second volume of the Handbook is a very creditable production.

MOLYBDENUM IN STEEL, *published by the Climax Molybdenum Co., 500 Fifth Ave., New York.*

This is a comprehensive treatise on molybdenum steel. After an Introduction, which deals with the various properties of steel and the processes employed in its fabrication, individual sections are devoted to the different kinds of molybdenum alloy steel, including chromium-molybdenum, nickel-chromium-molybdenum, nickel-molybdenum, carbon-molybdenum, manganese-molybdenum, and silicon-molybdenum steel. Other sections deal with steels for use at elevated temperatures, corrosion-resisting steels, nitriding steels, die steels, high-speed steels, and cast steels. In each section devoted to any particular kind of alloy, analyses of the steels of this kind are given, together with the results of physical tests, in either tabular or charted form. The book will no doubt prove valuable to the automotive engineer and metallurgist.

Calendar of Coming Events

CONVENTIONS AND MEETINGS

National Petroleum Association Meeting, Atlantic City, N. J.....Sept. 14-16
Seventh International Management Congress, Washington .....Sept. 19-23
SAE National Regional Fuel and Lubricants Meeting, Tulsa, Okla..Oct. 6-7
SAE National Aircraft Production Meeting, Los Angeles, Calif...Oct. 13-15
American Welding Society Meeting, Detroit .....Oct. 17-21
SAE Annual Dinner, New York....Nov. 14
SAE National Transportation Engineering Meeting, New York . Nov. 14-16
National Safety Council Meeting, Chicago .....Nov. 14-18
American Petroleum Institute Meeting, Chicago .....Nov. 14-18
National Industrial Traffic League Meeting, New York .....Nov. 17-18
Automotive Service Industries Show, Chicago .....Dec. 5-10
*National Standard Parts Association Meeting, Chicago .....Dec. 2-3
SAE Annual Meeting, Detroit....Jan. 9-13

SHOWS

New York, National Motor Truck Show, Nov. 11-17
New York, National Automobile Show, Nov. 11-18
Pittsburgh, Pa., Automobile Show, Nov. 11-18
Detroit, Mich., Automobile Show, Nov. 11-19
Columbus, Ohio, Automobile Show, Nov. 12-18
Buffalo, N. Y., Automobile Show..Nov. 12-19
Chicago, Ill., Automobile Show..Nov. 12-19
Milwaukee, Wis., Automobile Show, Nov. 12-19
Minneapolis, Minn., Automobile Show, Nov. 12-19
*Philadelphia, Pa., Automobile Show, Nov. 12-19
*San Francisco, Calif., Automobile Show .....Nov. 12-19
Boston, Mass., Automobile Show, Nov. 12-19
Los Angeles, Calif., Automobile Show, Nov. 12-20
*St. Louis, Mo., Automobile Show, Nov. 12-20
*Elmira, N. Y., Automobile Show, Nov. 14-19
New Haven, Conn., Automobile Show, Nov. 14-19
Indianapolis, Ind., Automobile Show, Nov. 19-25
Baltimore, Md., Automobile Show, Nov. 19-26
Rochester, N. Y., Automobile Show, Nov. 19-26
Montreal, Canada, Automobile Show, Nov. 19-26
*Washington, D. C., Automobile Show, Nov. 19-26
*Cincinnati, Ohio, Automobile Show, Nov. 20-26
Newark, N. J., Automobile Show, Nov. 26-Dec. 3
Denver, Colo., Automobile Show, Dec. 5-10

*Tentative

Trico Acquires Patents On Vehicle Signal

John R. Oishei, president of the Trico Products Corp. of Buffalo, has patented a vehicle signal, rights to which have been acquired by the Trico Products Corp., according to the United States Patent Office. The Trico firm also has acquired rights to a windshield cleaner invented by Erwin C. Horton of Hamburg and a windshield cleaner arm invented by Anton Rappi of Buffalo.

Houde Resumes Operations

The Houde Engineering Corp., Buffalo, N. Y., has resumed production again on a somewhat curtailed basis after a two-week shutdown for inventory purposes.

Just Among Ourselves

Love of Statistics Shows More Results

JOHN SCOVILLE, Chrysler's economist, is fond of remarking that the automobile industry is "fortunate in its statistics." Last week the *Investors' Review* of London in quoting some figures from AUTOMOTIVE INDUSTRIES, remarked on the fact that the figures printed were much more detailed than British stockholders were accustomed to getting, and mused on the "American love of statistics."

This morning there was a statistician in the office with a sad story. Around the first of January last he presented his superiors with a forecast of business conditions which showed a downtrend lasting until the first of September. So he got fired—because of their implicit confidence in his reasoning.

So, with those preliminaries, we'd like to point out that there are some new figures, not previously available, in this week's issue. Beginning last month, the Automobile Manufacturers Association began to make available retail automobile sales figures by months, based on actual sales returns from passenger car factories. Previously all sales figures available to the public were based on registration summaries supplied by R. L. Polk & Co., and other similar reporting agencies. Naturally there were and will always be some discrepancies between registration figures for a given month and actual sales made in that month. For some purposes the sales figures are most valuable, and for others the registration figures are the chief desideratum.

In any case, now that the actual sales figures are available back to January of 1937, we have decided that an estimate of dealer stocks can be made that will include fewer uncertainties than previous estimates, and the job has been done on page 71. The accuracy of such estimates for a given month depends entirely on the accuracy of the estimate of stocks on hand at the starting point, which, for our purpose, we have chosen as January, 1937, to conform to the availability of sales and production figures. For the beginning estimate of dealer stocks we alone are responsible, after due checking with the educated guessers of the industry. From the beginning point onward, of course, the figures used are beyond reproach.

Once again, thanks to the tireless effort of the statistical department of the Automobile Manufacturers Association and the cooperation of the factories, the statistical picture of the industry is a little more complete. Incidentally, the factory-reported sales figures include data from the State of Wisconsin.

Suppose Henry Ford Met Economic Planners

OFTEN a spokesman for the petroleum industry, J. Howard Pew, president of the Sun Oil Co., made some remarks about the automobile industry, in a recent Princeton address, that are memorable for their sharp definition of a current attitude.

Said he: "We may speculate with some interest as to what might have been the attitude of a National Planning Board, if one had existed, in the year 1900, toward the automobile and oil industries of that day. There were then about 8000 motor cars in the country, consuming about 3,360,000 gallons of gasoline a year. That would operate the motor vehicles of today about an hour and a half! One may imagine Henry Ford, with his vision of the automobile's future, appearing before the planning board, to ask that in its program for the next two or three decades it consider providing a few billions of capital, along with the material and labor, for his industry. The planning authorities would have recognized Mr. Ford as a mild lunatic. They would have asked where he hoped to get the gasoline to operate all these cars, pointing out that neither the gasoline nor the petroleum from which to make it was anywhere in sight. So Mr. Ford's demands would have been rejected. A sophisticated public would have laughed at Ford when the planners set down genius as insanity and inventive capacity as lunacy; and that would have ended foolish talk about horseless carriages and flying machines."

Price "De-Control" Jolts British Trade

SEVERAL automobile manufacturers in England have removed the established sale price from new cars and in effect told dealers to sell them for what they can get. Several other manufacturers are threatening to follow suit. This action, coming in what is regarded as "mid-season" by some of the more conservative English dealers, has caused mild consternation in the retailing end of the English business. The Motor Trade Association, which includes representation of both manufacturer and dealer, has devoted a lot of attention to price maintenance. Question: What is the status of manufacturer-members who have plumbed for price "de-control"?

Reasons for the move seem to be desperation at decimated sales; instinct to start buying on the part of the public at any cost. Until recently the British industry was harassed by dumping of German-made cars, which helped the market to a rapid saturation. Imports of cars into Britain have dropped, but not enough to offset the damage. How the British market will react to the present move is doubtful, but the results should be watched with interest by an industry which has a lot of its dealers clamoring for increased discounts or a junking subsidy.

—HERBERT HOSKING

THE CHILTON ROUND TABLE

In order to give readers of AUTOMOTIVE INDUSTRIES a clue to certain merchandising and service aspects of the automotive industry which are normally outside the scope of an industrial publication, we present herewith excerpts from the July issues of the four other magazines published by the Automotive Division of the Chilton Co.

From MOTOR AGE

Daytona Beach, Fla., is reported making plans for renewal of speed competition in 1939. *The scene of world-land-speed-record activity, until the trials were moved to Bonneville Saltbed in Utah in* 1935, *is planning a stock car event similar to the one run in March,* 1936.

The 250*-mile stock car race run in* 1936 *was won by Milt Marion, Indianapolis driver, of St. Albans, N. Y. Present arrangements call for the next event to be run early in the year, probably in February or March next.*

From COMMERCIAL CAR JOURNAL

A far-reaching decision by the Ohio Supreme Court upholds the right of cities to set up official inspection stations as part of an organized safety program. This establishes a precedent which will doubtless be referred to should municipal testing stations in other States be similarly challenged.

From AUTOMOBILE TRADE JOURNAL

Reporting a conversation between two garagemen at a recent outing of Philadelphia Boosters and Servicemen: "This highway-safety racket is ruinin' the wreckin' business. I ain't had a decent, first-class wreck in months —just a few dimpled fenders, that's all."

From MOTOR WORLD WHOLESALE

The Automotive Service Industries Show has only begun to scratch the surface of the things it might accomplish, even though it does succeed in bringing so many manufacturers together for a solid week of business conferences. So, the emphasis this year is being placed upon its merchandising possibilities.

Thermostatic

By JOSEPH GESCHELIN

THERMAL elements of the type used in automotive engineering may be divided into two basic types — thermostatic bimetals, and heat-sensitive metal bellows of various form. Bimetal is not a new product nor are its properties obscure for as far back as 1863 Villarceau published a very complete analysis of its characteristics in the *Annales de L'Observatoire Imperial de Paris.* Almost 100 years ago, thermal elements were being made by soldering together strips of platinum, gold and silver. When these were exposed to sufficient heat, a definite "bending motion" was observed to take place. Such thermal elements were then used, in a limited way, for mechanical thermometers, the bending movements actuating the pointer and indicating the rise and fall of temperature.

As the cost of gold and silver was prohibitive, experiments began with other cheaper metals. Combinations of brass and iron proved more favorable. Then in 1899, Invar, which contains 36 per cent nickel and 64 per cent iron, was invented. Its invention was the result of a search for low expansive material for measuring standards and for improving the accuracy of chronometers. Its use for bimetallic action, due to its low expansion, was soon recognized and bimetal made of Invar and brass became a commercial product.

Bimetals

What is bimetal—that is probably the first term that requires definition. Thermostatic bimetal is a heat-sensitive element composed of two metals united by riveting, brazing, or welding, one metal possessing a high coefficient of expansion, the other a low coefficient of expansion. When exposed to heat or temperature rise, the material of high expansion properties will expand or lengthen, the other material, being of low expansive properties, will have little or no expansion. The result is a bending action. When the temperature drops, the high expansive material shrinks back to its original length and the bimetal returns to its original shape. Should the same piece of bimetal be subjected to low temperature, it would bend in the opposite direction and straighten out again with rise in temperature.

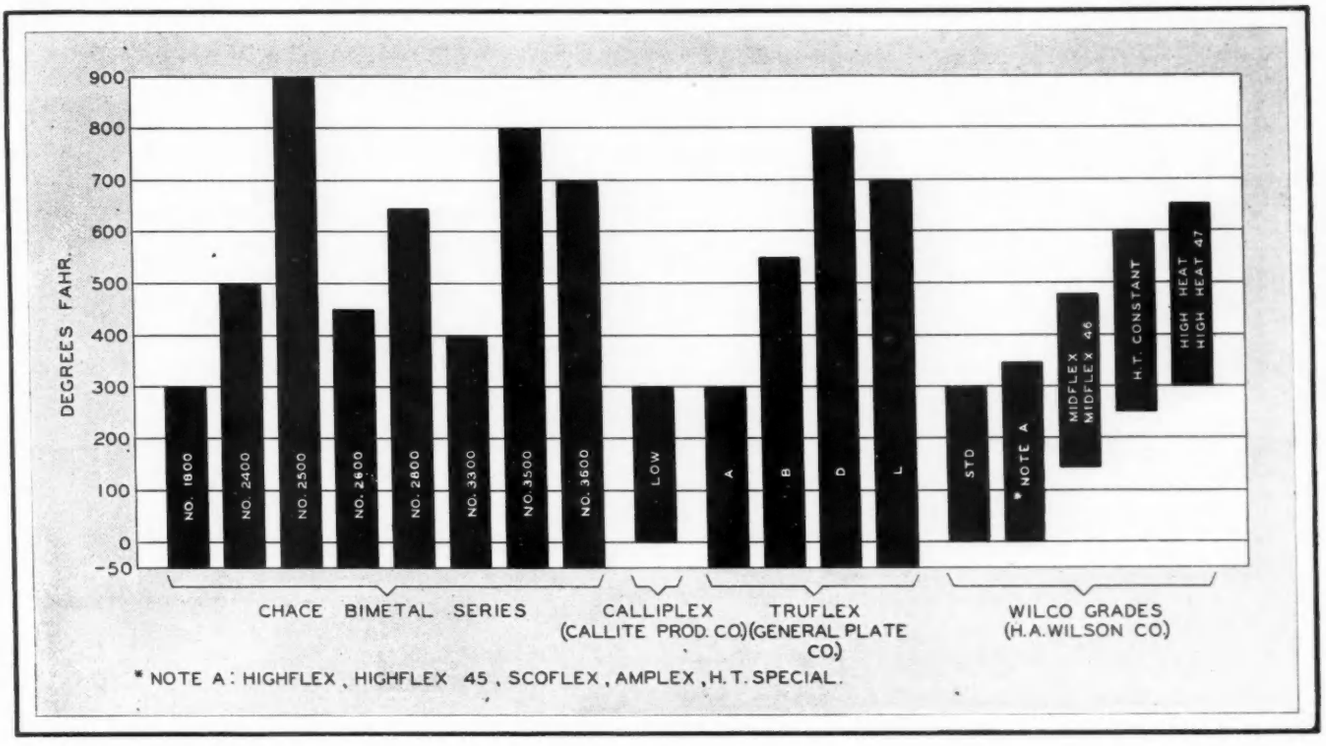
Raw materials of many special compositions are used in making bimetal. Each combination has a definitely known range of deflection. There are combinations available suited for working under conditions of ordinary temperature; and likewise combinations best applicable where the temperature conditions are extreme—as high as 1200 deg. Fahr. and as low as 50 deg. Fahr. below zero.

As manufactured today, bimetal is a highly technical product with a precise control of its essential characteristics. Nothing short of such technical perfection will do. With proper application and selection of materials for a specific range of temperatures, the bimetal element will invariably deflect the same amount per degree of temperature change. It is important to note in this connection that the deflection of bimetal is accompanied by a positive mechanical force which may be used to actuate any of a variety of mechanical movements.

Thermostatic bimetal, in general, may be applied in the following ways:

17 Automotive Materials

Bimetals and Thermostats



Sensitive temperature range for certain makes of thermostatic bimetals

1. Automatic regulation of temperature.
2. Automatic indication in meters and gages.
3. Automatic compensation for temperature change.

It is possible to select bimetals sensitive to temperature change either from a heat source or from the effect of an electric current passed through the element, producing a temperature rise.

In a very general way it may be said that certain nickel-iron alloys are widely used in thermostatic metals. The bimetallic strip now generally has Invar type on the low-expansion side. While brass is sometimes used on the high-expansion side, with Invar on the low-expansion side, the use of a nickel-chromium iron on the high-expansion side is increasing.

Nickel-chromium iron used for the high-expansion side of thermostatic bimetals usually contains about 22 per cent nickel and 3 to 8 per cent chromium. An Invar type alloy having a higher nickel content (up to 42 per cent) is sometimes used on the low-expansion side particularly in cases where the thermostat must be sensitive to temperature changes at relatively high temperature levels. For instance, the expansion of Invar increases rapidly above 400 deg. Fahr. With 42 per cent nickel iron on the low-expansion side, some sensitivity in the low-temperature range is sacrificed.

However, the fact is that bimetal as produced by the several principal suppliers is a proprietary material composed of a variety of metal combinations each uniquely suited to a definite range of temperature. The amount of movement or power required by the mechanism is satisfied by selecting bimetal of suitable dimensions and forms. For this reason we shall content ourselves simply by listing the trade names of bimetals corresponding to specified temperature ranges. This information will be found in tables reproduced elsewhere.

It might be noted that the low temperature grades of most of the current bimetals is a brass-Invar combination. At this writing, Calliflex specializes primarily in a low temperature grade composed of a selected copper-zinc alloy on the high-expansion side, and Invar on the low expansion side. Other grades of the commercially available bimetals comprise various proprietary combinations of special alloys.

Bimetal is available in strip form in a variety of widths and thicknesses. It can be made up in many special forms such as a flat spring, U-form, hairpin, ring, coil spring, torsion spring, and other forms depending upon the nature of the job to be done. Some of the forms in which bimetal has been made may be seen in the illustrations reproduced here.

All of the organizations engaged in the manufacture of bimetal materials offer a complete engineering

service to the users and will aid in the development of specific applications. This is rather fortunate because the technical experience thus available will save much of the experimental work that ordinarily would be required for the solution of a given problem.

As an aid to the experimental approach in the design of bimetal elements, we have reproduced the fundamental formulas for several of the more commonly used forms of thermostatic elements. It will be noted that each of the fundamental equations is modified by a constant (c) which varies not only with the form of the spring but also in accordance with the coefficient of the specific brand and type of bimetal. For this reason we have omitted the coefficients, which, however, are readily available from each of the suppliers. To show the modifying effect of the constant we give herewith the range for one make of bimetal.*

In general, it should be borne in mind that the bimetal element is subjected to thermal as well as mechanical stresses and due allowances must be made in any design for limiting stresses as well as the effect of fatigue. These values will vary with the type of materials that are available for the purposes, each material having its own natural limitations. However, the producers offer a wealth of information that may be used empirically for the solution of an individual problem.

A fairly lengthy list of applications of bimetals and thermostats has been printed elsewhere in this article. While it would be quite impossible to describe each of these applications in detail, it is well to emphasize at this point that several applications account for much of the thermostatic bimetal used in passenger cars.

Prominent among these are the following—cooling system temperature control, both by metallic bellows and bimetal elements; exhaust temperature control on practically every make of car on the market; carburetor automatic chokes of various designs; fast idle control on certain makes of cars. Many other applications are listed for passenger cars and trucks; also a few examples of

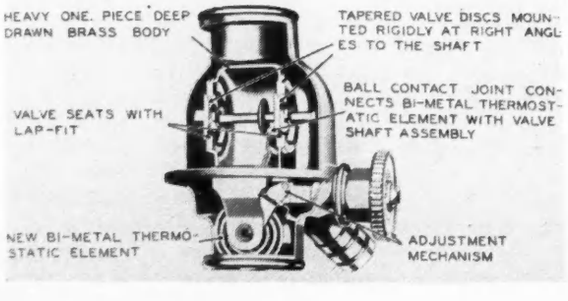
*Those who wish to pursue further the study of bimetal characteristics are referred to an article by T. A. Rich of the General Electric Co., "Thermo-Mechanics of Bimetal," *General Electric Review*, February, 1934. The author offers a study based upon visualization of the phenomena, quite beyond the scope of purely mechanical mathematical analysis.

List of Principal Automotive Applications of Bi-Metal

Air Dryers
Air Heaters
Air Valves
Altitude Meters
Automatic Chokes
Automatic Exhaust Heat Control
Carburetor Choke
Carburetor Control
Carburetor Manifold Heater
Carburetor Temperature Regulator
Cigar Lighter
Circuit Breakers
Damper Controls
Electric Blinker Torches
Fans
Fast Idle
Fuel Converter
Gas-Kerosene Carburetor
Gasoline Gauge Indicators
Generator Cut-Outs
Generator Voltage
Light Flashers
Oil Gauges
Oil Purifiers
Overload Protection in Electric Circuits
Radiator Shutter Controls
Relays, Overload
Relays, Signal
Scales
Shock Absorbers
Signal Devices—Tail Lights
Sign Flashers
Starting Devices
Temperature Compensation for Shock Absorbers
Voltage Regulator
Vulcanizers
Water Circulation, Auto
Water Heaters, Electric
Water Heaters, Gas
Water Temperature Control
Windshield Defrosters

List of Suppliers of Thermostats and Thermostatic Metals

W. M. Chace Co.
Callite Products Division of Eisler Electric Corporation
Dole Valve Co.
H. A. Wilson Co.
Bridgeport Thermostat Co.
Excel Auto Radiator Co.
Fulton Sylphon Co.
American Injector Co.
Bishop & Babcock Mfg. Co.
Clifford Manufacturing Co.
General Plate Co.
Baker & Co.
Improved Seamless Wire Co.
Vennerbeck & Clase Co.



Sectional view of Dole poppet valve thermostat

unique controls which may find expression on heavy duty equipment in the near future.

According to the Dole Valve Co., well-known producers of bimetal and bi-metal automotive heat sensitive devices, one of the earliest applications in the automotive field was that of temperature control of the water recirculating cooling system. The successful use of the Dole bimetal thermostat for this purpose now represents one of the largest single uses of bimetal in the automotive industry.

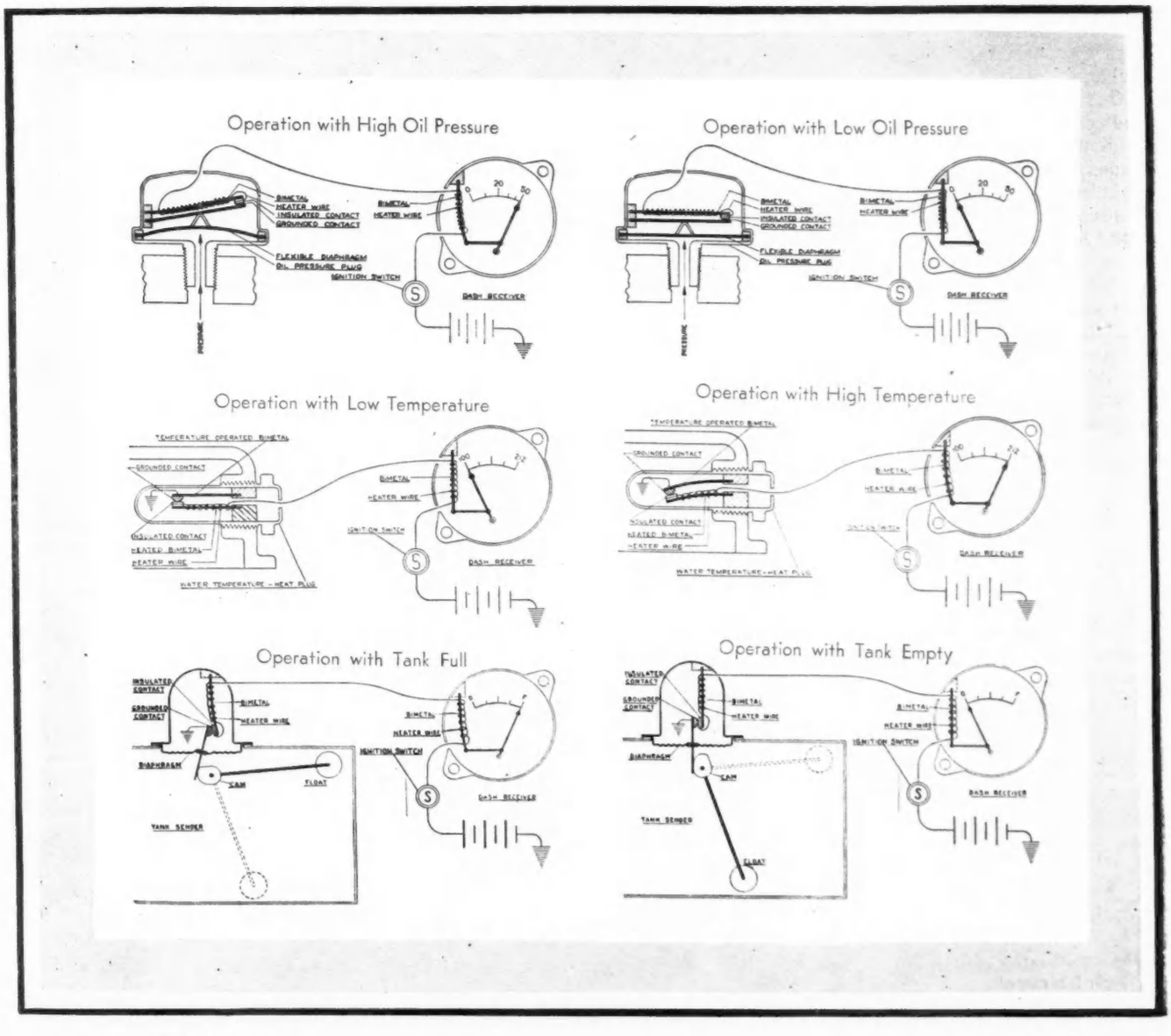
Later developments produced climatic control of intake manifold temperatures by means of the bimetal exhaust manifold heat valve. This control consists of a properly designed exhaust manifold heat valve which directs exhaust heat against the "hot spot vaporizer" built into the intake manifold and is caused to gradually reduce the amount of heat by means of a bypass arrangement. A widely used form of climatic control for the heat valve consists essentially of a bimetal coil mounted externally in the shaft extension of the heat valve in such position that the mean operating temperature of the coil is proportionately governed by atmospheric temperature and exhaust temperatures.

Among the special devices employing bimetal elements we might note in passing the Casco cigar lighter and an automatic exhaust manifold thermostat made by the American Injector Co. The Casco cigar lighter needs no special mention as it is standard equipment this year on one of the fine car lines and was recently adopted as optional equipment by one of the independent car builders. In this device, the thermostatic element automatically disconnects the lighter when heated, producing at the same time a clicking sound to warn the user. It may be put down as an excellent safety feature not only for the operator of the car but also as protection against premature burning out of the lighter.

The special manifold thermostat made by the American Injector Co. is an ingenious device for producing a rapid warm-up of the engine, designed specifically for Ford V-8 and Lincoln-Zephyr cars as a *replacement* item and has been used as standard equipment by Ford of Canada.

In principle, the device consists of a tube which carries a double vane of thermostatic bimetal. In the cold position the vanes close off the tube and prevent circulation until the de-

Application of thermostatic bimetals in design of King-Seeley Electric Telegages



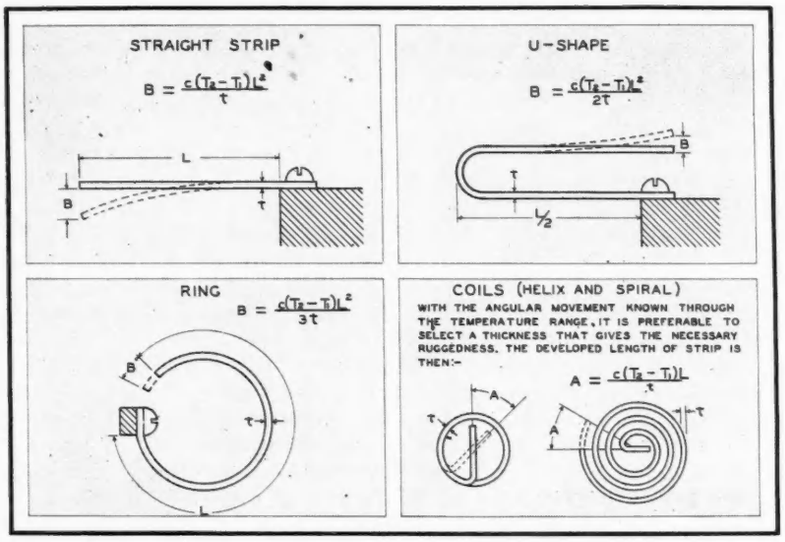


Table 1

Formulas for several widely used types of bimetal elements. Courtesy, General Plate Co.

The following formulae and notation will aid in calculating the dimensions of Thermostatic Bimetal elements:

B—Deflection of strip in inches
A—Deflection of coil in angular degrees
T_2-T_1—Temperature change degrees F.
L—Length of strip in inches
t—Thickness of strip in inches
w—Width of strip in inches
c—Deflection constant of bimetal

sired temperature is reached, when they start to open and allow free circulation through the tube. In the water thermostats a temperature of 140 deg. Fahr. must be reached before the thermostat opens, and it is full open at 160 deg. Fahr.

On the 25-hp. Wolseley limousine and coupe recently introduced in England, the standard equipment includes a thermostatically controlled cylinder-wall lubricator invented by a prominent woman motorist, the Hon. Ruth Cokayne. Patent rights were originally secured by the S. U. Carburetter Co. for use in conjunction with the S. U. thermostatic starting-mixture control, but now the device has been made available for all makes of carburetors.

Known as the Thermoil cold-start lubricator, it consists of a "bottle" fitted under the hood containing sufficient lubricant for approximately 2000 cold starts. The outlet leading to the induction manifold is opened and closed by a thermostatically operated valve that remains open so long as the cooling water temperature is below 95 deg. Fahr.

The selling rights have been acquired by Alexander Duckman & Co., Ltd.

Versatility of bimetal application gives this material wide scope in the automotive field. At the present moment the role of heat-sensitive materials is relatively unplumbed, since they have been applied, in general, in places where the need for special control has been almost obvious. Consider a few of the possible new applications:

1. Control of relief valves for hydraulic mechanism of any kind where temperature change occurs.
2. Control of relief line valves for all kinds of oil pressure lines where temperature change occurs.
3. Indicating instruments and other devices remotely controlled on rear engine passenger cars and buses.
4. Control of brake adjustment to compensate for fading due to excessive temperature rise.
5. Control of water pump speeds.
6. Clutch control for fan drives on trucks and buses, permitting cut-out of fan in cold weather.

These are but a few of the high-spots of possible new applications of bimetal. Unquestionably many important control devices may be developed in the future if designing engineers become more familiar with the characteristics of bimetal and gain facility in their use.

Metallic Bellows

Among the most familiar of the thermostatic devices is the metallic bellows which has been used for years on automotive equipment of various kinds. Most popular applications have been in the cooling system circuit, and on automatic radiator shutters. The bellows also has been used as a fixed or variable control in hot water heater circuits.

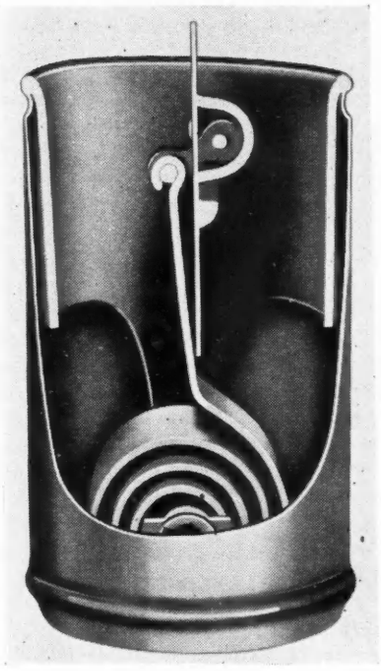
Table 2

Deflection constants for a specific line of bimetals, to illustrate how constant, C, modifies the formulas in Table 1.

Deflection Constants

Table 2—Deflection constants (c) for the preceding formulae are as follows for various Bimetal Types of certain makes.

STRAIGHT STRIP U-SHAPE RING	SPIRAL COIL— HELIX COIL
.0000077	.00090
.0000077	.00090
.0000065	.00078
.0000068	.00080
.0000050	.00062
.0000070	.00083
.0000059	.00068
.0000031	.00037
.0000081	.00095
.0000040	.00048



Sectional view of Dole butterfly type thermostat with bimetal control

Among the manufacturers of metallic bellows thermostats are the following well-known organizations: Fulton Sylphon Co., Bishop & Babcock Mfg. Co., and the Clifford Mfg. Co., makers of hydron bellows.

In general, it may be noted that the bellows has dual characteristics —that of a spring, and that of a container or envelope which may be hermetically sealed.

A bellows behaves much the same as a helical coiled compression spring, following largely the same elastic laws, but with much greater limitations. In practice it is essential to take all of the stroke of the bellows on the compression side of the free length.

The number of convolutions per inch in a bellows corresponds to the number of coils per inch of length in a spring. With the same wire size in a spring or the same wall thickness in a bellows, the flexibility will increase directly and proportionately with the number of coils or convolutions per inch of length. Doubling the number of convolutions doubles the flexibility or halves the spring rate. The number of convolutions per inch of length can be varied within certain limits to obtain a lower spring rate.

The simpler procedure is to obtain a greater number of convolutions by using a longer bellows. The only limitations are those of the forming equipment and the instability of the bellows, where the length exceeds the diameter by such amount as to cause distortion by buckling. The tendency to buckle or distort axially is dependent on the ratio of length to diameter, exactly as with a helical spring. It has been found by experience that the length should not be much greater than the diameter to obtain the most satisfactory operation, although with light loading this ratio may be increased. It is sometimes impossible to realize necessary flexibility without increasing the length to a figure twice that of the diameter or even more. Under such conditions either an external or internal guide is recommended.

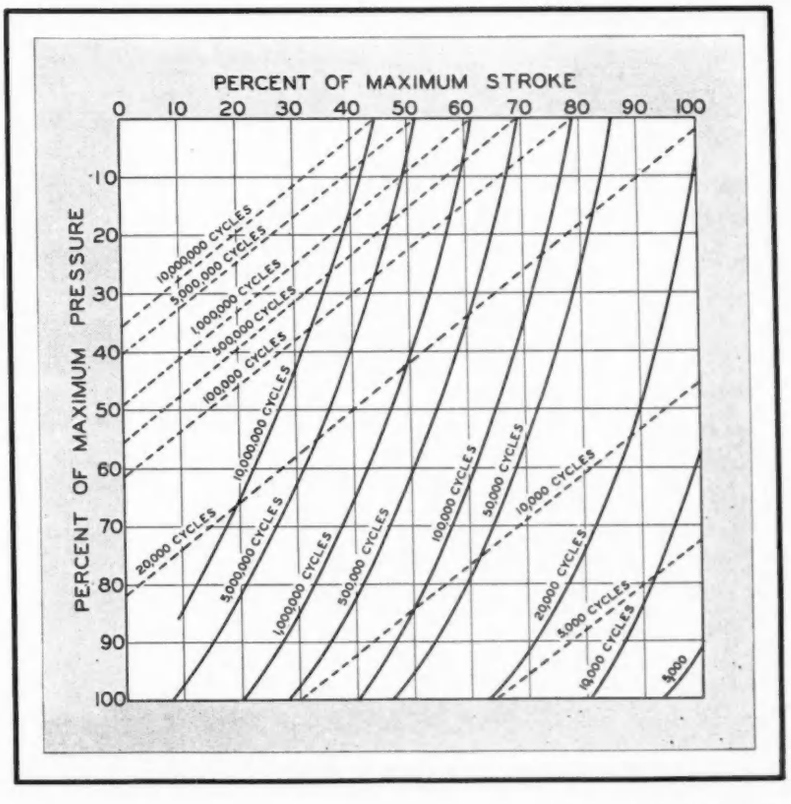
While a discussion of the advantages and disadvantages of various metals for bellows manufacture would be quite beyond the scope of this study, it is feasible to mention a few of the principal metals and alloys commonly used. In the first place, sound metal free from inclusions of foreign matter is a paramount necessity. Of all the common non-ferrous alloys, brass holds first place in this respect. The casting and rolling technique as applied to ordinary brass has been developed far beyond that of any other alloy. This is responsible for the excellence which it is possible to impart to such a metal when sufficient care is exercised in its production.

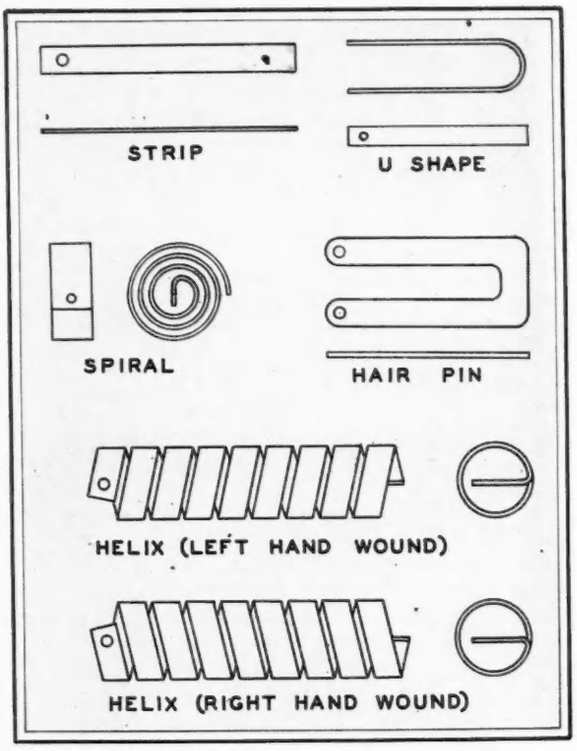
Brass used for bellows consists essentially of copper and zinc in a great variety of combinations. A thin wall bellows requires a metal of good deep drawing properties and one reasonably resistant to slight corrosion. A brass consisting of 80 per cent copper and 20 per cent zinc has excellent deep-drawing properties and, of equal importance, is not readily subject to so-called "season-cracking." A copper content higher than 80 per cent impairs spring properties materially. Reducing the copper content produces susceptibility to season-cracking.

The next most important alloy is phosphor bronze containing essentially 95 per cent copper and 5 per cent tin. It has properties equal to brass and is more resistant to some types of corrosion. It is more difficult to control and handle from the casting of the original ingot down to the finished bellows, and is accordingly more expensive.

Next in importance are alloys of the copper-nickel series. Cupronickel, containing approximately 30 per cent nickel with addition of 1 per cent tin, known as Adnic, produced by the Scovill Mfg. Co., is widely used for bellows; also cupronickel of 20 per cent nickel and up

Life prediction chart for Hydron bellows thermostats made by Clifford Mfg. Co.





Variety of forms in which bimetal elements are available. Courtesy, W. M. Chace Co.

to 5 per cent of zinc, known as Ambrac, produced by the American Brass Co. Everdur, a manganese-silicon-bronze, produced by the same company, may be used. Monel metal and pure nickel are sometimes necessary. Low carbon steel is available for use under certain conditions.

Use of special alloys is justified only where conditions of corrosion are so severe as to preclude the possibility of using brass or bronze successfully. While lacking in desirable elastic properties, they are particularly resistant to "stress corrosion" and must be used in many places. The more common adaptations are in hot water systems and high-pressure steam devices.

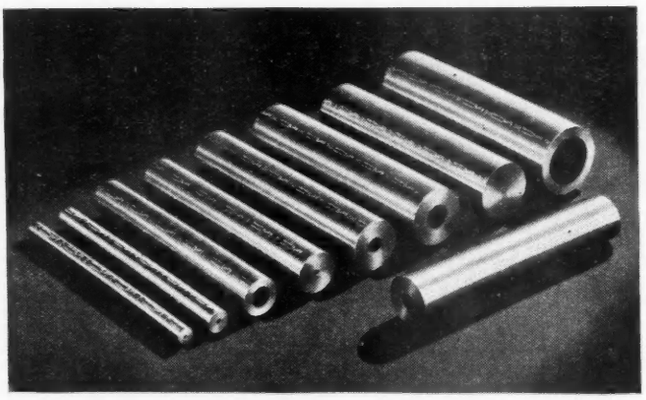
An interesting bellows is the so-called silver clad unit. This is formed from a tube of bimetal, which consists of a layer of brass intimately bonded by welding to a layer of pure silver. The silver layer can be on the inside or on the outside or on both sides of the brass bellows tube.

Automotive Materials

"Precision Bronze Bars" Developed by Bunting

Over 240 sizes of fully machined cored and solid bronze bars are now offered in a new line known as "Bunting Precision Bronze Bars" recently announced by the Bunting Brass & Bronze Co., Toledo, Ohio, manufacturers of bronze bearings, bronze parts and bearing metals. The material used in these bars was developed and perfected by the company to provide an alloy with sufficient strength to resist heavy loads and perform satisfactorily under different adverse operating conditions and embodying exceptional anti-frictional qualities.

Designated as Bunting No. 72, also as SAE 660, this metal was evolved by research programs at the Mellon Institute, Bureau of Standards and Battelle Memorial Institute, backed by a company research and development program within the Bunting plant. A thorough survey of bearing life in both laboratory and field is said to have proved conclusively that this alloy, composed of 83 per cent copper, 7 per cent tin, 7 per cent lead, and 3 per cent zinc, had the ability to furnish the desired requirements.



A few of the more than 240 sizes of fully machined cored and solid bronze bars that comprise the new line announced by the Bunting Brass & Bronze Co.

The new bars are made by casting technique which is claimed to produce a metallic structure of unvarying uniformity regardless of diameter or wall thickness. This technique, according to the Bunting company, also produces added anti-frictional and wear-resisting properties superior to those of bars made by other methods.

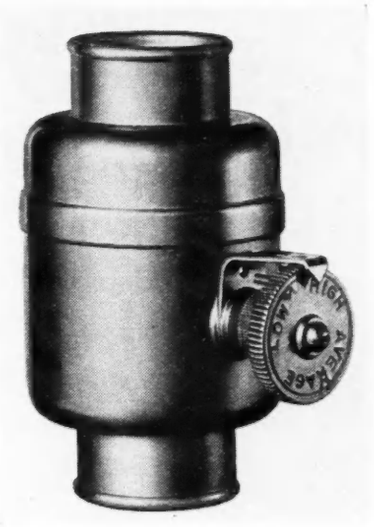
These bars, in addition to the machined outside diameter and 13-in. lengths, have the cored sizes machined in the bore to the same accurate dimensions as have been common to the O.D., which the company points out results in a degree of concentricity not possible in rough bars. Enough stock is permitted to remain on the O.D. and I.D. to finish a bearing from the bar to the size stamped on the bar by taking off only a 1/64-in. cut. As these bars are supplied in the finished state, valuable savings are

The life of a bellows in service is determined by the cumulative effect of the stresses to which it is subjected. Stresses resulting from flexing are separate and distinct from those due to pressure, but the sum of both is the limiting factor of service life. A bellows may fatigue from flexing alone without application of pressure, or from pressure impulses alone without flexing, or from a combination of both.

Calculation of these stresses and their relation to life must take cognizance of all variables such as those of wall thickness, inside and outside diameters, contour or shape of convolutions, physical properties of the metal, direction and nature of applied forces, etc.

Due to the complexity of mathematical solutions, we have reproduced elsewhere a life prediction chart, through the courtesy of the Clifford Mfg. Co. This gives an empirical estimate of the life of metallic bellows.

In this field, as in the case of bimetal applications, the various suppliers offer an engineering service to the automotive industry. This service makes it possible to leave to the supplier the matter of actually recommending the design of the unit, its material, etc., having given the operation requirements and dimensional limitations.



Sylphon Autostat, metallic bellows type thermostat made by Fulton Sylphon Co.

Summary

The foregoing brief discussion of bimetals and metallic bellows is intended to place an emphasis upon the role of heat-sensitive devices and controls in automotive mechanism. Design in recent years has shown very definite trends to more automaticity of control functions, taking more of the important controls out of the hands of the operator.

Better appreciation of the various heat-sensitive devices and their field of application should go far toward the solution of many new problems with a consequent improvement in the performance of any automotive unit to which such controls may be applied.

NEW DEVELOPMENTS

Section of the laboratory in the National Smelting Co.'s new experimental foundry and research department which was recently opened at the Cleveland plant. This room houses a mechanical strength testing machine; an indicating, recording, and controlling potentiometer; and a battery of fatigue testing machines.

said to be effected by the user in reduced machining time and minimum waste of metal. The 13-in. length has proved most suitable for obtaining the greatest number of pieces without excessive waste.

New Research Facilities For National Smelting Co.

National Smelting Co., said to be the largest producer of secondary aluminum in the United States, recently opened a new experimental foundry and research department at its Cleveland plant.

In the experimental foundry, sand and chill molds of all descriptions are poured to determine not only the best metal for any particular casting but, also, to observe the action of different alloys in connection with foundry problems, such as gating and shrinkage. There are various types of electrical furnaces, as well as those of the open hearth and pot types, also a forging machine fed by a furnace with automatic temperature control. A trimming room is part of the experimental foundry. Connected with this is a machine shop where test bars are finished, and where new laboratory and smelting equipment is designed and built.

The laboratory proper consists of a large room with modern machines for testing tensile strength, fatigue, impact values, hardness, and the resistance of various alloys to the corrosion of salt spray. Other rooms house facilities for the exact determination of the composition and structure of various alloys, a spectrograph, and a microphotometer. In addition, there are instruments to determine the electrical and thermal conductivity, and the thermal expansion of alloys.

A Resin to Increase Density of Castings

After a few years use by several foundries, General Plastics, Inc., North Tonawanda, N. Y., has announced its No. 278 impregnating resin to be commercially available. This solution of specially formulated resin is for increasing the density of certain types of castings.

Castings of the proper alloy will withstand high liquid or gaseous pressure, but often an alloy may be specified for reasons of chemical resistance which may not be the most desirable type for casting a solid, non-porous structure. Occasionally, too, the necessary design of the casting may present problems in manu-

(Turn to page 91, please)

How Do Buyers Feel About Today's Cars

By THOMAS G. MACGOWAN*

***Sales are down. It's a good year for feeling the public's pulse. This is the first of a series of articles in which Thomas G. MacGowan will report some of its aberrations for you exclusively in* AUTOMOTIVE INDUSTRIES**

WHAT do the car buyers of America actually think about present-day automobiles? How well satisfied are they with their appearance, construction and performance?

And what would the typical automobile-buying man and woman do to *improve* passenger cars—if he or she could have carte blanche to make them over?

Would they introduce cars of radical appearance—or cling to more conservative designs?

Finally—what do Mr. and Mrs. America think about the all-important question of highway safety? Where do they place the blame for the great number of automobile accidents and deaths? What would they do to reduce this toll?

These are the questions which we have investigated in a nation-wide survey among the car-buying public of this country.

This study is the first comprehensive research into consumers' ideas on the cars of the present day and of the future, and into their attitude on highway safety.

The present article tells what people think are the best points of automobiles today, and how they rate their present cars in comparison with the cars just previously owned, with regard to a list of features of design, construction and performance.*

It also compares the present experience of the persons interviewed, in respect to gasoline and oil mileage, with what they feel their cars should deliver.

The survey as a whole includes personal interviews with 542 automobile owners in all parts of the country. This "survey sample" was distributed in a scientific manner so as to typify the American car owner generally, in terms of his geographical location and the sizes of the cities and towns in which he lives.

It included men and women in the following proportions:

	Number	Per Cent
Men	382	70.5
Women	160	29.5
Total	542	100.0

This sex distribution closely approximates the known actual distribution between men and women drivers.

As to age, 33.8 per cent of the persons interviewed were from 20 to 29 years old, inclusive; 30.4 per cent were between 30 and 39; 34.1 per cent 40 and over; and 1.7 per cent were not classified as to age.

In respect to the price classes of the cars owned, the following proportions were used: low, 56.5 per cent; medium and high combined, 43.5 per cent. This division makes possible intelligent comparisons between the responses of the two groups. The high-priced car owners were added to those in the medium-priced field because they would otherwise have cut too small a figure in a survey of this size.

The first question on the subject of attitudes toward present-day cars was:

> "What do you think is the one best point in the design and construction of automobiles today?"

This question was not followed by any sort of check-list; the respondents could say anything they want-

WHAT MEN AND WOMEN LIKE BEST ABOUT PRESENT DAY AUTOMOBILES

Question: "What do you think is the one best point in the design and construction of automobiles today?"

TABLE 1 GENERAL SUMMARY

	Men %	Women %	Total %
BODY CONSTRUCTION			
Body	38.4	26.8	35.0
Windshields and windows	7.8	15.9	10.2
Chassis and frame	1.1	....	.8
Other responses	1.6	4.4	2.5
MECHANICAL PARTS AND FEATURES			
Brakes	15.9	13.4	15.1
Engine	9.1	5.1	7.9
Springs	3.2	2.5	3.0
Transmission	1.3	3.2	1.9
Steering	1.6	.6	1.3
Other responses	2.4	3.8	3.1
GENERAL CHARACTERISTICS			
Appearance	21.2	25.5	22.5
Lowness	5.7	8.3	6.4
Safety	3.8	1.9	3.2
Ease of handling	3.2	1.9	2.8
Ease of riding	3.5	1.3	2.8
Comfort	.8	3.8	1.7
Other responses	3.2	5.1	5.5

Percentages are based on the total number responding to the question.

*Other articles completing the survey will be published in early issues of AUTOMOTIVE INDUSTRIES. Mr. MacGowan is president of Facts, Inc., independent market-research agency in New York. The field surveys, on which the articles are based, were made by Facts, Inc., with the cooperation of AUTOMOTIVE INDUSTRIES.

s . . . Today?

ed to, without prompting or reminding on the part of either the questionnaire or the interviewer.

A total of 529 persons answered the question; some of them could not confine themselves to the "one best point," with the result that 663 individual answers were tabulated. These have been brought into general groupings as follows:

	Men's Resp's	Women's Resp's	Total
General	34.4%	38.5%	35.6%
Body construction	38.9	37.9	38.6
Mechanical	26.7	23.6	25.8
Total	100.0	100.0	100.0

The "general" responses had to do with characteristics rather than with features: women, as might have been expected, tended to express themselves by such answers, while men were more inclined to mention specific parts of the automobile, which are grouped as "body construction" or "mechanical" in the table above.

Table No. 1 presents a certain amount of detail under each of these classifications. This table shows that the body of the car, or some part of the body, was most frequently mentioned in answer to this question, and that the car's appearance came

TABLE A

OWNER'S COMPARISON OF PRESENT CAR WITH LAST CAR

QUESTION: "IS YOUR PRESENT CAR BETTER THAN YOUR LAST, WORSE, OR THE SAME, IN RESPECT TO---?"

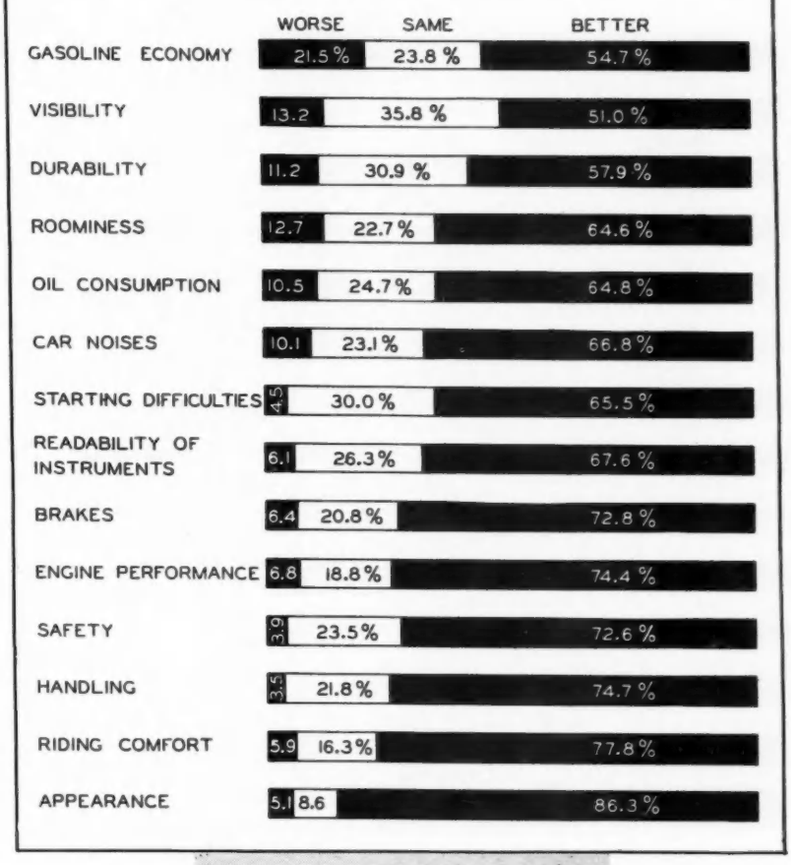


TABLE 2 PERCENTAGE INDICES OF NET IMPROVEMENT : COMPARISON OF PRESENT CAR WITH LAST CAR

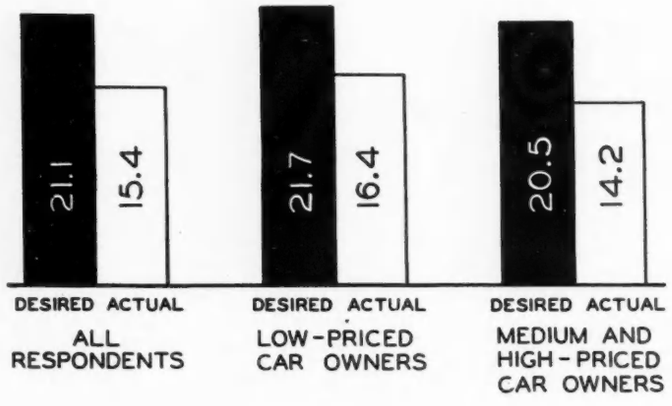
Question: "Is your present car better than your last, worse, or the same, in respect to . . . ?"	All Respondents		BY PRICE CLASSES OF CARS OWNED: Low		Medium and High		BY MODEL—YEARS OF CARS OWNED: 1937 and 1938		1935 and 1936		1934 and Earlier	
	Rank	Index	Rank	Index	Rank	Index	Rank	Index	Rank	Index	Rank	Index
Appearance	1	90.6	1	90.5	1	90.8	1	92.1	1	91.1	1	88.8
Riding ease	2	86.0	5	82.8	2	90.1	2	88.7	4	85.6	2	83.8
Handling ease	3	85.6	2	85.9	3	85.3	3	88.4	3	86.2	4	82.6
Safety	4	84.4	4	83.4	5	84.0	5	84.3	2	86.3	6	82.3
Engine performance	5	83.8	3	83.7	6	83.9	4	86.2	6	82.3	3	83.7
Brakes	6	83.2	6	82.3	4	84.4	7	83.5	5	83.4	5	82.5
Readability of instrument panel dials	7	80.8	7	80.8	8	80.7	9	81.6	7	81.4	8	79.2
Steering difficulties	8	80.5	8	79.6	7	81.2	8	81.8	9	79.8	7	80.4
Car noises	9	78.4	10	76.6	9	80.0	6	83.7	11	75.7	9	76.3
Economy of oil consumption	10	77.2	9	78.5	12	75.6	10	80.7	8	80.3	13	70.6
Roominess	11	76.0	11	75.0	10	77.4	11	78.7	10	78.0	12	71.2
Durability	12	73.4	13	71.7	11	75.7	12	73.4	12	72.6	10	74.9
Visibility	13	68.9	14	67.9	13	70.2	14	70.7	14	64.3	11	72.6
Economy of gas consumption	14	66.6	12	72.2	14	59.6	13	71.7	13	68.5	14	59.7

Indices are computed by adding half the percentage of mentions of "same" to the total percentage of mentions of "better."

TABLE B GASOLINE MILEAGE, DESIRED AND ACTUAL

QUESTION: (A) "WHAT GASOLINE MILEAGE DO YOU THINK YOU SHOULD GET?"
(B) "WHAT DO YOU GET?"

AVERAGE RESPONSES IN TERMS OF MILES PER GALLON



next. Here is the way the principal types of mention came out:

Body	35.0%
Appearance	22.5
Brakes	15.1
Windshields and windows	10.2
Engine	7.9
Lowness	6.4

The responses which were more popular with men than with women were: "body," "brakes," "engine," "springs," "steering," "safety," "ease in handling," and "ease of riding." Women more frequently mentioned "windshields and windows," "transmission," "appearance," "lowness," and "comfort."

The complete list of items mentioned by the persons interviewed was, of course, much longer than the list given in Table 1, most of which represents a certain amount of reclassification. There were actually 87 different items mentioned in the course of the survey.

Since the question referred to the "one best point" in present-day automobile design and construction, perhaps the most interesting tabulation of all gives the responses in the order of most frequent mention, without any attempt at reclassifying them. The following table gives the leading responses and the number of mentions of each of them:

Steel bodies	137
Streamlining	87
Brakes	80
Safety glass	53
Engines	40
Lowness of design	34
Improved appearance	29
One-piece steel top	26
Safety	17
Handling ease	15
Riding ease	15
Roominess	14
Automatic transmissions	8
Other responses	108
Total	663

The responses in this list which were particularly favored by men were: "steel bodies," "brakes," "engines," "one-piece steel top," "safety," "handling ease" and "riding ease." Women favored "streamlining," "safety glass," "lowness of design," "improved appearance," "roominess" and "automatic transmissions."

Women were less concerned than men with safety in general, with steel bodies, with brakes, with steel tops and other safety promoting features, with the single exception of safety glass. In the case of this feature, women outvoted men about two to one. This is probably because women consider shatterable glass a hazard to beauty.

It is also interesting to note that women are more favorable than men to automatic transmissions. In a later article in this series, we pre-

GASOLINE MILEAGE, DESIRED AND ACTUAL

Questions: (a) "What gasoline mileage do you think you should get?"
(b) "What do you get?"

TABLE 3

GASOLINE	TOTAL		PRICE CLASSES				MODEL—YEARS					
			Low		Medium and High		1937—1938		1935—1936		1934 and Earlier	
MILES PER GALLON	Desired	Actual	Desired	Actual	Desired	Actual	Desired	Actual	Desired	Actual	Desired	Actual
5 to 9	1	15	0	1	1	14	..	2	..	1	1	12
10 to 14	17	149	2	53	15	96	4	27	4	45	9	77
15 to 19	170	339	85	219	85	120	53	123	53	130	64	85
20 to 24	230	36	135	31	95	5	76	14	84	10	69	12
25 to 29	81	..	58	..	23	..	25	..	30	..	26	..
30 to 34	22	..	12	..	10	..	6	..	7	..	9	..
35 and more	16	..	11	..	5	..	2	..	6	..	8	..
TOTAL	537	539	303	304	234	235	166	166	184	186	186	186
No response	5	3	3	2	2	1	..	..	3	1	2	2
TOTAL	542	542	306	306	236	236	166	166	187	187	188	188

sent the comparative reactions of men and women as obtained in answer to a question devoted entirely to automatic transmissions.

To sum up the results of this question, it appears that men are more impressed than are women with the following general features of automobile design and construction: "safety," "engine performance," "handling ease" and "riding ease." Women are more favorably impressed than are men with "appearance," "roominess" and "general comfort."

The second question which had to do with attitudes toward present-day automobiles was:

> "Is your present car better than your last, worse, or the same in respect to —?"

The questionnaire then listed 14 features with a place for each feature to be checked "worse," "same" or "better."

This question, of course, not alone serves to measure car owners' opinions of the cars they now own, but it also points to the trends, either upward or downward, which may be developing with regard to the various features.

Every feature showed a net gain for the present car in comparison with the last, but there was a great deal of difference in the *amount* of improvement which, in the average, the respondents in this survey attributed to the various items.

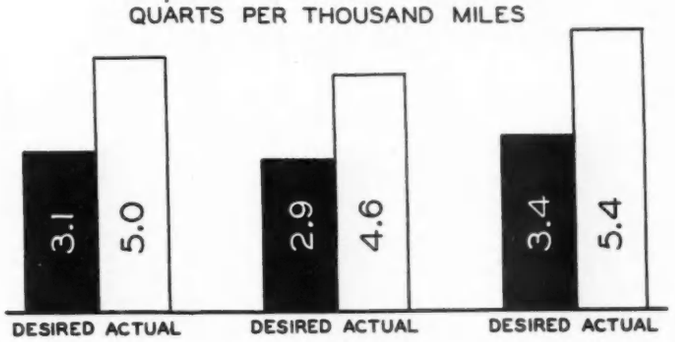
"Appearance" was placed first by them. Only 3.1 per cent of the respondents thought that their present cars were *worse* than their last in appearance, only 8.6 per cent thought that they were the same in this regard, and the remainder, 86.3 per cent, were sure that their cars had been improved in looks. Next in order of greatest improvement, in the opinion of the average respondent, come "riding ease," "handling ease" and "safety."

The feature which has recorded the least improvement of all, in car owners' opinion, is "economy of gas consumption." A total of 21.5 per cent of the persons interviewed said their gas consumption was worse than with their last car, 23.8 per cent said it was the same, and only 54.7

TABLE C OIL CONSUMPTION, DESIRED AND ACTUAL

QUESTION: (A) "HOW MUCH OIL DO YOU THINK YOU SHOULD HAVE TO USE?"
(B) "HOW MUCH DO YOU USE?"

AVERAGE RESPONSES IN TERMS OF QUARTS PER THOUSAND MILES



OIL CONSUMPTION, DESIRED AND ACTUAL

Questions: (a) "How much oil do you think you should have to use?"
(b) "How much do you use?"

TABLE 4

OIL			PRICE CLASSES				MODEL—YEARS					
	TOTAL		Low		Medium and High		1937—1938		1935—1936		1934 and Earlier	
QUARTS PER 1000 MILES	Desired	Actual	Desired	Actual	Desired	Actual	Desired	Actual	Desired	Actual	Desired	Actual
Up to 1	41	15	25	9	16	6	14	8	16	5	11	2
1 to 2	111	62	63	34	48	28	32	20	34	28	45	14
2 to 3	130	76	81	45	49	31	37	29	43	22	50	25
3 to 4	49	61	25	32	24	29	18	17	19	19	12	25
4 to 5	37	47	18	31	19	16	8	15	13	19	16	13
5 to 6	71	81	45	52	26	29	27	27	25	25	19	29
6 to 7	31	62	17	33	14	29	12	25	11	20	8	17
7 to 8	10	25	2	11	8	14	4	7	3	10	3	8
8 to 9	6	18	1	8	5	10	1	3	1	6	4	9
9 to 10	1	3	..	1	1	2	..	..	1	3	..	..
10 to 11	12	32	8	16	4	16	2	1	5	4	5	27
11 and over	4	18	..	8	4	10	..	2	2	9	2	7
TOTAL	503	500	285	280	218	220	155	154	173	170	175	176
No response	39	42	21	26	18	16	11	12	14	17	13	12
TOTAL	542	542	306	306	236	236	166	166	187	187	188	188

per cent said it was better. Next to this feature, at the bottom of the list, is "visibility," which also had a poor composite rating as to improvement, and next above that is "durability."

In order to present the findings on this question clearly, it was necessary for us to develop percentage indices of net improvement. These indices have been computed by adding half the percentage of mentions of "same" to the entire percentage of mentions of "better." The indices thus computed are used in Table 2, in which the features are arranged in the order of greatest net improvement.

Riding Comfort Important

This table gives breakdowns by price classes and by years of cars owned.

Chart A is based upon the same findings, but it represents the responses of the entire number of persons interviewed, *in inverted order*, that is, with the features which have shown the smallest amount of net improvement appearing at the top of the chart.

Table 2 shows some interesting differences in the breakdowns. Improvement in "riding ease" was much more often mentioned by owners of low-priced cars than by owners of medium- and high-priced automobiles. These owners, also, did not place "economy of gas consumption" at the bottom of the list; they put it near the bottom, but they reserved the extreme position for "visibility." The chief idiosyncrasy of medium- and high-priced car-owners was unusual satisfaction with their brakes and with increased economy in oil consumption.

Owners of comparatively recent cars—those of the model-years 1937 and 1938—did not place economy of gas consumption at the bottom of the list. They rated this item as No. 13 in the list of 14, as did the owners of cars of the vintages of 1935 and 1936. Only owners of cars of 1934 or earlier placed gas economy at the extreme bottom. Owners of the most recent cars gave a comparatively good rating to "car noise." On the other hand, owners of 1935 and 1936 cars were not very well satisfied on this point.

It is interesting to compare the responses to this question with those obtained from the question on "best points." They should dovetail fairly closely. Do they?

They agree exceptionally well, especially when it is considered that the question on "best points" was not accompanied by a check list, whereas the question on comparison of present and former cars did have such a list.

The outstanding conclusions to be drawn from these two questions as a whole are these:

The sorest point with the automobile consumer today is lack of economy in gasoline consumption. Next to that, in the order named, come visibility and durability.

Other points upon which the automobile owner is at present relatively dissatisfied are: quiet (freedom from car noises), ventilation, economy of oil consumption and roominess.

The car owner is best satisfied with his car on the score of safety.

He thinks his car has recently improved, however, more with regard to appearance than with regard to anything else, including safety, which is second in improvement.

The important thing to the car manufacturer is, of course, not so much what the automobile owner thinks about his present automobile, its best points or its features of superiority over his last car—but what he thinks ought to be done to improve it. This study has investigated the matter of desired improvements specifically and in considerable detail with a series of questions directly on the point.

Gasoline Economy

The next article in the series will report the results of these questions, and will provide data which should be considered in connection with the findings given in the present article.

However, this article will take up the question of gasoline economy in detail. It was believed in advance that this would require special study and two questions were devoted to it. Two questions were also devoted to the economy of oil consumption.

In investigating the consumers' ideas on economy in gasoline and oil consumption we sought a direct comparison between the consumption which the people interviewed thought they ought to get and the consumption which they actually did get.

The questions on gasoline consumption were:

"What gasoline mileage do you think you should get?"

"What do you get?"

The responses were recorded and tabulated in terms of the average number of miles per gallon. When a respondent gave different mileages for city and country driving, these were averaged. Otherwise, he was requested to express his mileage in terms of the average of all his driving. The responses were tabulated to the half mile per gallon, and then reclassified in five-mile groupings for presentation in Table 3. This table provides breakdowns by price-classes and model-years of cars owned. Chart B presents graphically the average mileages desired and obtained by all respondents and by those in the two car ownership price classes.

A study of Table 3 shows at a glance the reason why economy of gas consumption came out so very badly on the two questions previously discussed. Of all car owners 65.0 per cent think they should get mileages of 20 miles per gal. or over, but only 6.7 per cent of them actually obtain such mileages. The same sort of situation works out in both price-classes of cars as follows:

	Want at least 20 mi. per gal.	Get at least 20 mi. per gal.
Low	71.3%	10.2%
Medium and high	56.8	2.1

The percentages, of course, are based on the total number of respondents.

In both price classes, then, at least half of the owners are *definitely dissatisfied* regarding gasoline mileage.

As shown by Chart B, the *average* car owner wants to be able to drive his car 21.1 miles per gal. of gasoline; at the present time, he is able to travel only 15.4 miles, which means that he would like to get an additional 5.7 miles travel per gal. Expressed percentage-wise, the average car owner would like to get 37.0 per cent more mileage.

What the Low-Priced Owner Wants

The low-priced car owner would like to obtain 21.7 miles, and actually gets about 16.4 miles which represents a desired increase of 32.3 per cent. On the other hand, the owner of a medium and high-priced car, on the average, would like to obtain 20.5 miles per gal. as compared with the 14.2 miles he is now getting; this would represent an increase of 44.4 per cent.

The average owner of a medium-priced or high-priced car is, therefore, *more* dissatisfied than is the low-priced owner. However, the low-priced car owner wants a higher average mileage than does the owner above that price class.

When this data is studied from the standpoint of the year-model of car owned, it is found that 1937-1938

(Turn to page 94, please)

A Resin for Porosity

(Continued from page 85)

facture which cause difficulty in feeding in the correct way to overcome shrinkage.

Slight porosity of castings which results from these causes is said to be successfully overcome and the casting made tight by the use of the No. 278 resin solution. Proper impregnation is made by pressure or vacuum and pressure. After impregnation, the casting is baked at 230 deg. Fahr. or higher to set the resin. When hardened in this way the resin is virtually unaffected by water, solvents, mild alkalies and acids.

Naturally, this treatment is costly. However, it is said to have proved of particular advantage where expensive castings have developed porosity after machining. Results are reported to have justified the expense where the conditions have required the elimination of such porosity.

Wrinkle Enamels In All Colors

Wrinkle enamels in all colors, including white and light pastel shades, have been developed by the Maas and Waldstein Co., Newark, N. J. It is claimed that no discoloration of these new Duart wrinkle enamels will occur during the baking process.

The manufacturer points out that the enamels will bake hard and wear resistant with a short baking period, and also that they will wrinkle uniformly.

The product is light in body and can be sprayed. Patterns can be varied from very fine and uniform to a coarse and heavy structure.

To Prevent Weld Spatter From Adhering to Metals

For the prevention of adhesion of weld spatter to metals which are to be welded, the General Electric Co. has announced a new material called Glyptal No. 1294. It is claimed that this material can be used without harm on any metal surface including polished stainless steel, will not produce carbon to make the weld hard or brittle, nor reduce ductility. Likewise, it will not give off smoke to fog up the atmosphere, nor will it form gas pockets or cause the weld to be porous.

To apply Glyptal preparation, spraying is recommended, as it assures a thinner coat than brushing. A thin coating will protect the work as well as a thick coating if the surface is completely covered and has the advantages of economy and faster drying. On surfaces which are to be painted, this material is said to provide an excellent priming coat. In addition, it prevents the forming of rust on steel in storage yards.

The preparation will withstand temperatures up to 1112 deg. Fahr. for one-half hour; after this length of time it will begin to evaporate.

Improve Finishing and Rust-Proofing Process

Six improvements in the Parkerizing Process for finishing and rust-proofing iron and steel products have been announced by the Parker Rust-Proof Co., Detroit. These are listed by the company as: shortened processing time, reduction in operating temperature, improvement in chemical formula, production of smoother coating, and lowering of equipment and operating costs.

Processing time has been reduced

to 30 minutes, whereas 60 to 90 minutes were required to apply the older process. Operating temperature has been reduced so that the new processing solution reacts at 180 deg. Fahr. instead of the 210 deg. Fahr formerly found necessary. Shortened processing time reduces the size and cost of processing tanks required to handle a certain volume of work and, also, lowers the cost of installation.

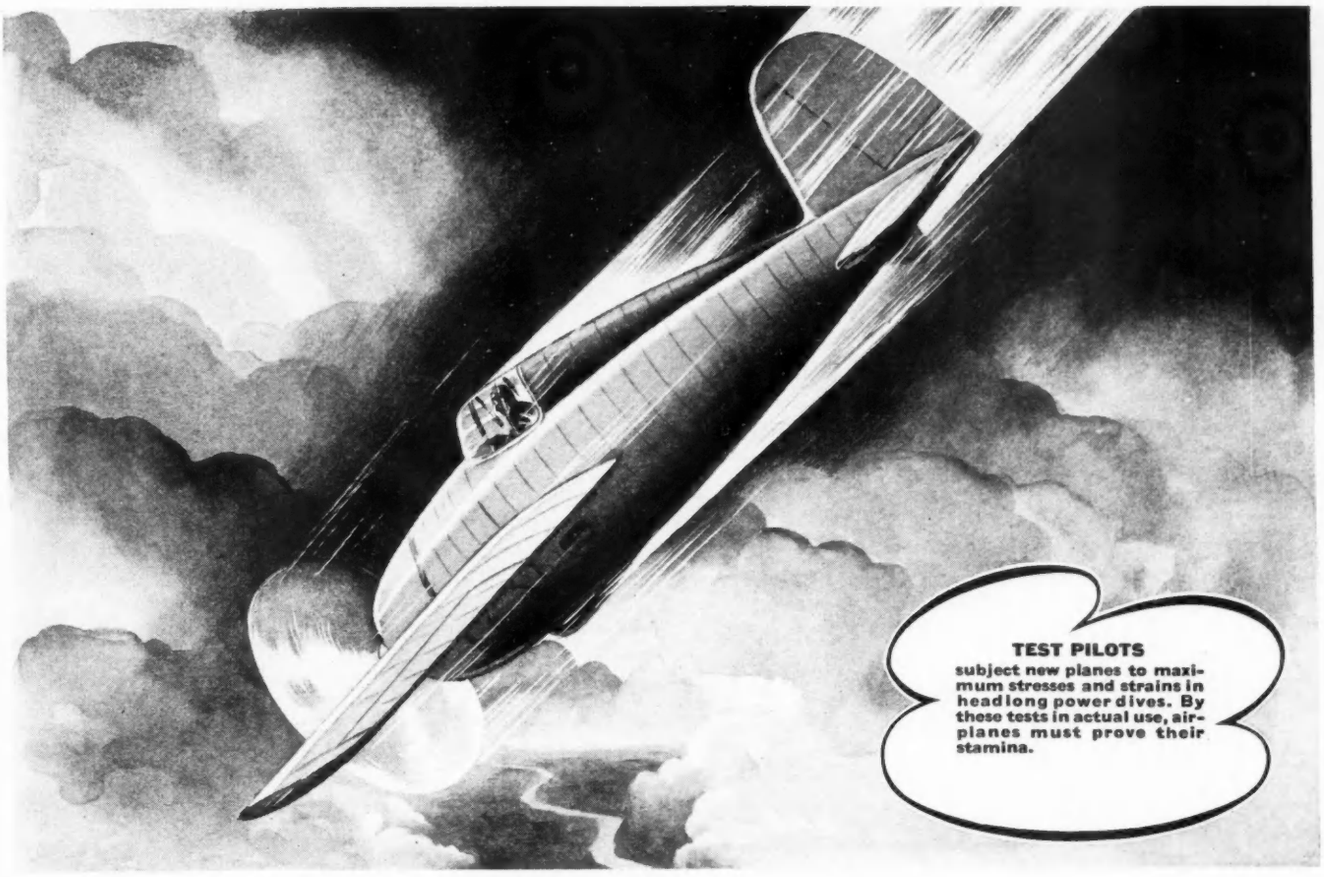
The improved liquid chemicals are said to develop less sludge in the processing tank and produce a finer grained, smoother coating. As pointed out by the company, this assures less change in metal contour and a minimum of build-up in fine threads.

Diesels for Distance

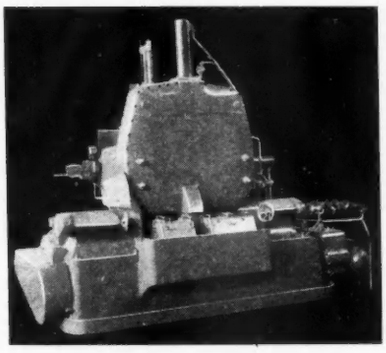
THE view largely prevalent in aircraft circles that for transatlantic flights the Diesel engine has the advantage over the carburetor engine was given additional support in an address which Lord Sempill, one of the foremost authorities on aviation problems in Great Britain, delivered before the British Engineers Association. Lord Sempill, in his introduction, referred to a number of historical matters, among others that only about 30 years ago the British Admiralty had turned down propositions made by the Wright brothers as not likely to lead to anything of practical value.

At the present, the speaker said, the only aim in view was to contrive aircraft of the conventional type that would carry more load per sq. ft. of wing area. Present-day machines on the London-Paris route had a wing loading of 16 to 20 lb. per sq. ft. The most efficient machine today was the Pan-American flying boat, which carried 34 lb. per sq. ft. As these machines had a wing area of about 2000 sq. ft., the difference became very considerable. A machine designed for the 20-lb. figure could not be loaded up too much without losing its airworthiness certificate, but if the machine were designed to the higher limit, it could not take off easily, this being the reason for such attempts at assisted launching as were represented by catapulting and by the Mayo composite craft. The first Wright machine to fly at all had a wing loading of 2 lb. per sq. ft. and power loading of 62¼ sq. ft. per hp., the latter being far higher than believed possible today for standard usage. That machine was started down an incline, a form of assisted launching. An airplane to carry 1000 lb. of mail between England and New York would be so heavily loaded as to be able to take off only on possibly one or two days of the year. The flying boats lying on the west coast of Ireland waiting for weather to cross to Newfoundland carried 20,000 lb. with crew and fuel, a loading of 26 lb. per sq. ft. If these boats could be assisted, it would be possible to add to the pay load.

The transatlantic aircraft had a weight of 45,000 lb., of which about one-half was fuel. A reserve was necessary, owing to the possibility of encountering contrary winds of 30 or 40 m.p.h over 2000 miles. If a part of the fuel could be saved, additional pay load could be carried. The latest long-distance flights with Diesel engines had shown a consumption not equaled by the carburetor engine even with 100-octane fuel. The latest figure was as low as 0.34 lb. per hp-hr., and if it were possible to change over to such an engine, it would be possible for the Atlantic boats to carry 3500 lb. of pay load, as against zero today. With a 15-hr. flight and 3000 hp., gasoline engines would require 19,000 lb. of fuel, and Diesel engines 14,500 lb. This resulted in a saving of 4500 lb.



THE TEST THAT PROVES



It is significant to note that Wickes Brothers come to Bantam for the Single Row Tapered Roller Bearings used on these lathes. They, like many other manufacturers of production machinery, have learned to rely completely on Bantam Bearings.

THE truest test of a product's worth is its performance in actual service. We ask you to judge BANTAM BEARINGS on that basis only.

Throughout industry, repeat orders prove that BANTAM has won customer confidence through outstanding performance records.

That's why Bantam has been continuously forging to the front in the bearing industry.

BANTAM BEARINGS CORPORATION
South Bend, Indiana
Subsidiary of THE TORRINGTON CO.
Torrington, Conn.

BANTAM
BEARINGS

TAPERED ROLLER • • • STRAIGHT ROLLER • • • BALL BEARINGS

How Do Buyers Feel About Today's Cars?

By THOMAS G. MACGOWAN

(Continued from page 90)

car owners want 20.5 miles per gal., and get 16.0 miles, on the average; that 1935-1936 car owners want 21.4 and get 15.6, and that 1934 and earlier car owners want 21.6 and get 14.6. It, therefore, appears that the older the car owned, the higher the average mileage desired and the lower the mileage obtained. From this it, of course, follows that the older the car owned, the more dissatisfied is its owner with his mileage.

The two questions which dealt with oil consumption were:

"How much oil do you think you should have to use?"

"How much do you use?"

Table 3 also presents the responses to this question, which have been tabulated in terms of the number of quarts per one thousand miles. Charts B and C also highlight this data, telling the story in terms of the average number of quarts consumer per thousand miles.

Here the measure of dissatisfaction has seemed to be large, but not as large as in the case of gasoline consumption. A total of 43.9 per cent of the persons interviewed think that they ought to use three quarts or more in each thousand miles of driving; however, 69.4 per cent of the respondents say that they actually do have to use as much oil as this. In other words, 25.5 per cent of the people interviewed do not use more than three quarts of oil per thousand miles, and don't think they ought to use so much.

Dissatisfaction in 2 Groups

We also find a great deal of dissatisfaction in both of the price classes. Comparison between these two classes, show that the owners of the medium- and high-priced cars are more dissatisfied with their oil consumption than are those who own low-priced cars.

Similarly, there is a great deal of dissatisfaction among owners of cars of all model-years, with the greatest amount of dissatisfaction naturally, occurring among people who own older cars. Among those who own cars of the model-year 1934, or earlier, the dissatisfaction is very marked.

As shown in Chart C, the average car owner thinks he should use 3.12 quarts of oil per thousand miles, and actually uses 4.96 quarts, a difference of 1.84 quarts per thousand miles. To state it simply, the average car owner is using about 5 quarts of oil per thousand miles, and wants to use only about 3.

Desires Alike On Quantity

The low-priced car owner, as would be expected, wants to use less oil, and *is* using less, than is the higher-priced car owner. Low-priced car owners would like to use 2.94 quarts of oil compared with the 4.59 quarts of oil they are actually using —a difference of 1.65 quarts, whereas medium- and high-priced car owners would like to use 3.36 quarts and do use 5.42—a difference of 2.06 quarts.

When the question of oil consumption is considered from the standpoint of year-model of car, it is found that, regardless of the year-model, all car owners want to use about the same quantity of oil per thousand miles, but that the older the car, the greater the amount of oil used. Therefore, the older the car the greater the dissatisfaction on this point.